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ELECTRICITY IN GYNECOLOGY

May Cushman Rice, M.D.

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ELECTRICITY IN GYNECOLOGY

THE PRACTICAL USES OF ELEC-
TRICITY IN DISEASES OF WOMEN

BY

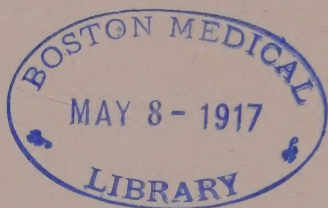
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ILLUSTRATED

1909

CHICAGO:
L. I. LAING & CO., PUBLISHERS



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PREFACE

I have undertaken the writing of this book in response to the frequent requests of physicians for such a work.

While many books have been written relating to the treatment, by electricity, of diseases in general and a few exclusively to the diseases of women, no text book has been published on this particular subject so concise and practical as to meet the urgent need of the busy practitioner, who has not the time to wade through large volumes and yet who would keep abreast of the times by using electricity where electricity is indicated. Therefore, the purpose of this book is twofold, expressed in the words, detail and brevity.

My object here is to give in as brief a manner as possible the physiological action and therapeutic application of the various electrical currents to the diseases of women.

In the light of our present knowledge the time is past when there is any doubt as to the value of electricity in gynecology.

The problems are rather in the particular

choice of currents, the polarity, the length of application and frequency of treatments.

Although the usefulness of electricity is recognized, these questions are puzzling many a practitioner who has seen the results obtained by his neighbor but is himself inexperienced.

An understanding of the physiological action of the continuous current is at once convincing proof that we have in it a means of contracting or dilating blood vessels at will; that we can, according to the choice of poles, produce sedation or stimulation, increase the size of organs, as in infantile uterus, or inhibit growth, as in fibroid tumors of the uterus or subinvolution.

By means of its cataphoric action we are enabled to deposit in diseased cells substances so powerful in germicidal and astringent properties that cure results.

To be able to discriminate between those diseases which should be dealt with by electricity and those which should be treated by other methods or be relegated to the surgeon, is a part of our education.

We wish it distinctly understood that our attitude is electricity for the patient, not the patient for electricity. We do not claim it to be a cure-all, neither do we wish to use it when another agent is to be preferred.

However, we are convinced from experience that electricity is essential to conservative gynecology.

This book is intended to supplement a course in electrotherapy. Anatomy and physics, easily obtainable elsewhere, will be omitted. On the other hand the handling of electrodes, covering, amalgamating, solutions for keeping covered electrodes and suitable pads will be considered in detail, for the purpose of assisting those who have already acquired a knowledge of the principles involved in treating patients in an intelligent manner.

M. C. R.

825 Marshall Field Bldg., Chicago.

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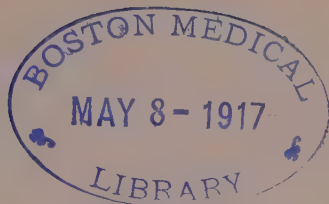
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CHAPTER I

GENERAL CHARACTERISTICS OF THE VARIOUS CURRENTS

Those currents, which previously have been named Galvanic and Faradic, owing to change in nomenclature, will be referred to throughout this work under the heads of continuous or constant, and induced currents.

THE CONTINUOUS CURRENT

The continuous current is differentiated from all others by being unidirectional; consequently, this peculiarity of polar action and current strength make it the only current available for producing decomposition or electrolysis. "Current electricity" is a comprehensive term, often applied to this form of electricity.

Electrolysis

A current with the above characteristic, when passed through substances having the right properties, like the tissues of the human body, causes chemical changes to take place in those substances. In other words, compounds are separated into their constituent elements. Faraday named this process

of decomposition, *electrolysis*, the decomposed substance, the *electrolyte*, and the products of decomposition, *ions*. The latter have a decided affinity for one pole or the other and, according to a well known law that "like poles repel and unlike poles attract each other," those which have an affinity for the negative pole, or cathode, are repelled by the positive pole, or anode, and are called electro-positive; those which seek the positive pole are repelled by the negative, and are termed electro-negative.

This phenomenon takes place in a degree proportionate to the amount of current passed.

The power possessed by the continuous current of producing chemical changes in living tissue makes it of great therapeutic value. It is the only one of all the electrical currents to have this property in sufficient amount to be utilized for electrolysis.

Cataphoresis

Another characteristic action, depending upon the above mentioned principle of chemical change, rendering the continuous current of great curative value, is, that, under its influence, medicines which have undergone decomposition or electrolysis, are carried into the tissues of the body by what is called cataphoresis. For ex-

ample, the iodine of potassium iodide solution, when applied to the negative pole, is utilized for reducing glandular enlargements; cocaine, for local anesthesia and thiosinamin, for dissolving scar tissue. As greater intelligence is being acquired relative to methods of applying it, cataphoresis is proving more and more useful. Local anesthesia is induced with solutions of cocaine, pain relieved by analgesics, and germicides used much more effectively in connection with the continuous current than simply by topical application.

Metallic Cataphoresis

Even more important to gynecology than the cataphoric action of liquids is the phenomenon which takes place when oxidizable metal electrodes are applied to tissues with the positive pole.

This process, although often spoken of as *metallic electrolysis*, is correctly termed *metallic cataphoresis*. Because of their affinity for the negative pole, such metals applied to the positive pole leave their respective electrodes, pass into the tissues in their vicinity, and there combine with the oxygen and chlorine of the body fluids, set free by electrolysis, to form salts.

The salts of some of these metals, especially

the copper salts, have highly germicidal and astringent properties which render them of inestimable value for all infective inflammations.

If the cataphoric medication be in the form of a liquid, applied upon cotton, sponge or other material, the base will seek the cathode; on the contrary, the other part of the compound, the acid, or that which takes its place, will seek the anode.

Metals, like bases, always seek the cathode. Therefore, we have a definite rule, with no exceptions, so easy to follow that mistakes need never occur in applying it.

Bases and metals, being electro-positive, are applied to the positive pole. Acids and substances taking their places, being electro-negative, are applied to the negative pole.

In nearly all instances the base or metal is the part of the compound which is utilized for therapeutic purposes. Iodine is one of the few electro-negative substances used for cataphoresis. To correct an error frequently made with reference to iodine, I wish to state that iodine, although an element, is a *non-metal*. Potassium and iodine are *not* two metals in combination, the iodine being less electro-positive than the potassium. It takes the place of the acid radical and is electro-negative, according to the rule.

DIFFERENCES IN THE POLES

The positive pole is sedative; contracts blood vessels; has the effect of an acid and accordingly is often spoken of as the acid pole. Conversely, the negative pole is a stimulant; dilates blood vessels and is alkaline in effect. The positive pole hardens, the negative softens tissues. Metals, under the influence of the positive pole, are oxidized by the current, so that, when that pole is used, the composition of the metal electrode must always be considered.

The negative pole does not affect metals, therefore with that pole any convenient metal may be used.

Because of the directly opposite action of the two poles it is clear that much depends upon an understanding of the principles involved.

The use of one pole when the other is indicated will do actual harm. Too often electricity is regarded as a therapeutic agent for experimental purposes. Illustrative of this is a statement made by a most eminent gynecologist: "If one pole fails, try the other." This is equivalent to saying *if a stimulant fails, try a sedative*. Is it to be wondered at that electricity is often discredited, when we consider how many people dabble in it without first acquiring a fundamental knowledge of electro-physics?

IMPORTANCE OF TESTING FOR POLARITY

All apparatus for continuous currents has some device for differentiating between the two poles. A pole changer points to the positive pole or the needle of the milliamperemeter turns to the positive. If, perchance, the wires conducting the current to the machine are disconnected, and if for any reason, when again connected, they are reversed, the poles will be changed. The carelessness of electricians in this respect and the

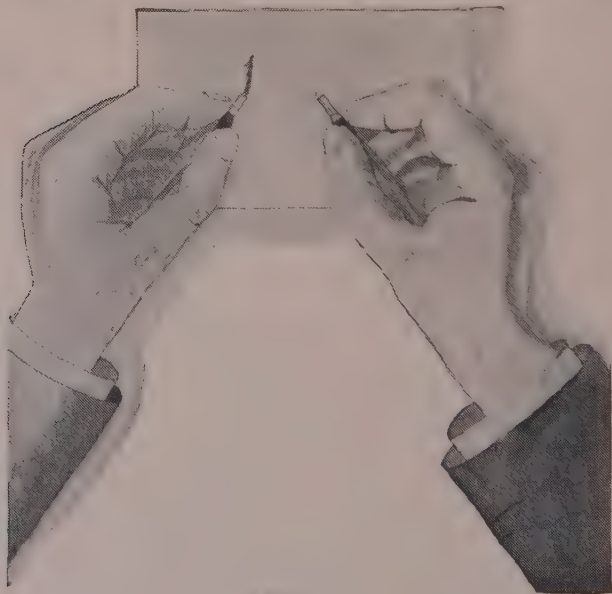


Fig. 1

necessity of testing one's own machine to determine its polarity, instead of depending upon any mechanism of the manufacturer, has been demonstrated in my own experience. Three times my wall plate, in being transferred from one location to another, was so connected that the pole changer, instead of pointing to the positive pole, as intended, pointed to the negative.

When my first wall plate was installed I took it for granted that the positive pole was that toward which the indicator on the pole changer pointed. My first case was a fibroid tumor of the uterus. When results were unsatisfactory I found that I had been using the negative pole. My lesson was learned. Since then I have always tested a machine when there was any chance for question as to polarity. Having been tested, the poles, unlike those of static electricity, will always remain the same, unless the conducting wires to the machine become reversed. This is unlikely to happen unless other people are using the machine.

Tests

Connect two tips of two separate cords with the two poles of the continuous current. Place the other two tips in a dish of water and turn on the current until bubbles appear at one of the tips. These are bubbles of hydrogen and the pole at which they are seen is the negative. This test is

hard on new cord tips and is not always clear, as, if much current is turned on, bubbles of oxygen, although smaller, will be seen at the positive pole. A better test is made by wetting a piece of white blotting paper with a saturated solution of potassium iodide, connecting the tips of two cords, as before, with the two poles and passing the other two tips (Fig. 1) over the wet blotting paper, when pure iodine will appear at the positive pole.

THE INDUCED CURRENT

The induced current, unlike the continuous, is alternating in character, and as the word *chemical* is often used in connection with the continuous current, so is the term *mechanical* applied to the induced current. Its value for therapeutic purposes depends upon the number of interruptions. With each turn of wire on the coil there is gain in voltage with corresponding decrease in amperage; therefore, it follows that a coil containing a sufficient number of turns of wire to be of use therapeutically must have a low amperage. Because of this small amperage, electrolytic changes, resulting from the use of this current, are so slight as not to be appreciable and are not to be considered in connection with its uses.

By excitation of nerves the induced current will cause muscles to contract, the blood to cir-

culate more freely, and exercise a general tonic effect upon the tissues within its influence. Especially is this the case if the contractions be made stronger and less frequent, by more slowly interrupting the current, as taken from the faradic coil, by an automatic rheotome.

The sedative action of the induced current is overestimated. It will produce sedation, but only when taken from the induction coil directly and the current passed long enough to exhaust the nerves and muscles. This will be sedation at the expense of tonicity. Using the current in this manner may be compared to the giving of phenacetine for headaches. The headache is relieved for a time but recurs with greater severity. Use the induced current with slow interruptions through the rheotome, with a view to its tonic action. The induced current is a valuable aid to the continuous current, but, in nearly every case, should be preceded by the latter.

INDICATIONS FOR PRIMARY AND SECONDARY CURRENTS

Believing that the prime object of the primary coil of wire is to magnetize the iron core and induce a current in the secondary, for purposes of massage, I never use the primary induced current, but always the secondary. In other words, it is

my opinion, that the primary induced current has practically no place in therapeutics.

THE SINUSOIDAL CURRENT

The sinusoidal current, for therapeutic purposes, is usually alternating in character, the alternations produced being smooth and even, instead of rough and irregular. It will do the same work as the induced current with less discomfort to the patient. It is used largely for giving powerful muscular contractions with a minimum amount of pain. The larger size, difficulty of operating and expense in running the sinusoidal current, make it popular with those only who wish to purchase elaborate outfits.

STATIC ELECTRICITY

Static electricity is a peculiar modality of electrical energy in that it is nearly all voltage and little or no amperage. This enormous voltage gives it physical properties differing altogether from other electrical currents, one of which is power to overcome a large amount of resistance.

In administering the continuous and induced currents it is necessary that both poles be in direct contact with the body of the patient. Furthermore, if any degree of penetration is desired, to thoroughly saturate the cuticle with moisture

in order to overcome its resistance, at least one of the electrodes must be wet.

In static electricity, the case is quite different, most currents being given by the direct application of one pole only, the opposite pole being grounded or placed at a considerable distance from the patient and the circuit completed through the ground or air.

In the continuous and induced currents the tissues acted upon are situated between the two poles in direct contact with the body, or at least in their vicinity. In other words, effects are local, any general benefit derived from the treatment being due to improvement in the local condition.

Static electricity, on the contrary, cannot be entirely localized. Its effects may be rendered more intense in one place than another by the use of variously constructed electrodes, but while these electrodes are being directed toward certain parts every cell of the body is being charged with a high potential current. This charge increases cell metabolism, thereby exercising a distinct influence upon nutrition.

Static electricity, on account of its small amperage, does not cause electrolytic changes in tissue; hence is useless, except for its tonic effect, in dealing with organic diseases. On the other hand, it is of inestimable value for functional de-

rangements of the system. As diseases of the pelvis nearly always are accompanied by general disturbances and therefore require general, as well as local treatment, static electricity has a large field of usefulness in this line of work.

While, however, general static treatments are given with great benefit to gynecological patients, there are certain forms of administration of the current of marked value for application directly to the pelvic organs. Of these, the most useful are the currents elaborated by W. J. Morton, of New York, namely *the Morton Wave* and *static induced currents*. In addition to these the high frequency current with glass vacuum electrode has indications as well met here as elsewhere in the body. This current may be taken directly from the static machine, as advised by Wm. Benham Snow, or it may be passed through an induction apparatus in circuit with either the static machine or X-ray Coil.

Together with the fact that decidedly beneficial results are obtained from the use of the vacuum electrode in the pelvis and rectum, its ease of application and freedom from discomfort to the patient, both during and subsequent to the treatment, are points which give it added favor with the gynecologist.

CHAPTER II

PRACTICAL POINTS IN APPLYING ELECTRIC CURRENTS

PREPARATION OF THE PATIENT

To secure relaxation of all parts and to facilitate the adjusting of the abdominal pad, removal of the corset is advised in all cases, but is the more essential when extra large pads become necessary for the dissemination of large currents. At first, patients do not like to take the trouble, but they soon become accustomed to it and find they are amply repaid by increased comfort during treatment in the recumbent position.

Repositing displaced organs, before all applications of electricity, and keeping them in place during the treatment will greatly favor their permanent restoration to a normal position. To accomplish this Sims's position is often necessary. Whenever there are no displaced organs the dorsal position will be found more convenient than Sims's chiefly on account of the greater ease with which the abdominal pad can be adjusted and kept in good contact with no danger of the metal

part of the pad touching the skin. Should this occur the skin would be burned and treatment would have to be suspended for the burn to heal.

Even though Sims's position be used for the treatment it is best, in placing the abdominal pad, to have the patient assume the dorsal position and then turn upon the side.

Rubber sheeting over the pad will insure dry clothing. If the rubber is carefully placed between the thighs and lower edge of the metal, the patient can hold the pad in contact with the abdomen and turn to the side, without danger of the metal touching the skin.

Mechanical vibration, with the patient in Sims's position, is often of great service in replacing the uterus. The vibrator handle, with ball attachment, is held in the left hand of the operator and applied externally over the uterus, while manipulation is made internally with the right hand.

INTRODUCTION OF ELECTRODES

Although some practitioners give intra-uterine treatments without a speculum, this, I believe, has obvious disadvantages. The careful cleansing of the vagina and swabbing of the cervix can be done only through the speculum, while working in the dark increases the liability of carrying

secretions from the vagina and cervix up into the uterus.

These objections to the introduction of intra-uterine electrodes without a speculum are particularly forcible when the negative or anti-germicial pole is the one employed. Vaginal applications do not require the use of the speculum, electrodes being easily introduced by means of a good lubricant.

LUBRICANTS

Vaseline and other oily substances are poor conductors of electricity and therefore do not make good lubricants. An ideal lubricant whenever one is needed is made from tragacanth, as follows:

R

Tragacanth (ribbon) \mathfrak{z} iv
 Acid Carbolicigtt. x
 Acid Boracic (sat. sol.) \mathfrak{z} xvi

M.

Let stand two days, stirring occasionally with a glass rod.

ELECTRODES

Electrodes are characterized as active or indifferent. Active electrodes are those directly applied to the lesion. They are of comparatively small size for the purpose of securing concentra-

tion of current. Indifferent electrodes consist of pads in some form placed upon the surface of the body to complete the circuit. For dissemination of the current, they are of much larger size than active electrodes.

INDIFFERENT ELECTRODES OR PADS

A pad, suitable for work with electricity, has three requirements; first, it must be of sufficient size and thickness to admit of a large amount of current without denuding the skin; second, it must cause as little discomfort as possible to the patient; and third, it must be of easily sterilized material.

The various pads on the market do not have these qualifications. In my efforts to find such a pad I evolved one made of absorbent cotton and table padding, commercially known as silence cloth, material used under tablecloths. This pad is easily made and is very durable. It may be any size and shape desired. The two most commonly used are the small neck and the large abdominal pad, which is eight by ten inches, the edges being rounded (Fig. 2).

Directions for making cotton pads. First cut a pattern and shape the table padding and absorbent cotton by it. Use two layers of table padding and from four to six layers of absorbent

cotton, according to the thickness of the layers. Fasten the cotton to the table padding by sewing

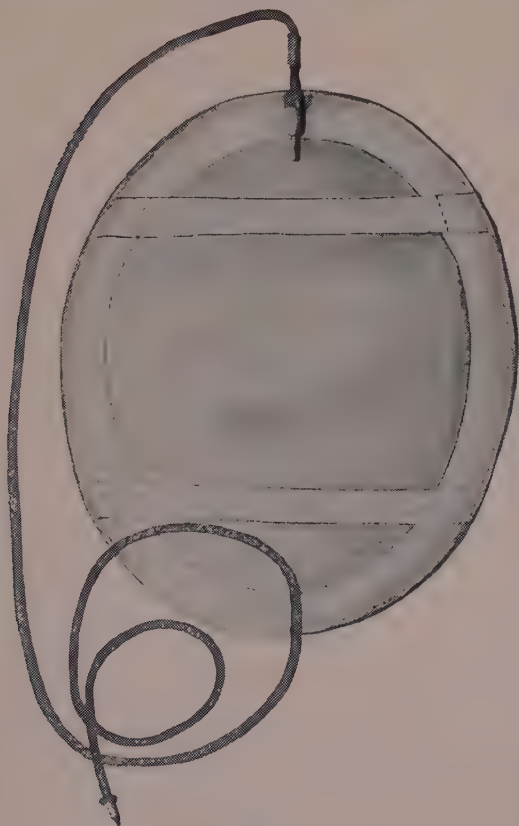


Fig. 2

through and through by hand. Machine sewing makes thin places where the stitches are taken

and is, therefore, objectionable. Cover with cheese cloth or other cotton material and fasten this to the table padding at intervals of about one inch. Lay across the pad two pieces of tape, an inch wide (see Fig. 2), two inches from either end, to hold the metal plate. Then bind the pad with tape.

The metal electrode consists of block tin and is of the same shape as the cotton pad, being one and one-half inches less in diameter. The connector should be permanently soldered to the metal plate to prevent the possibility of its coming out during the treatment, with resultant shock to the patient in consequence of the sudden cutting off of the current.

Before using the pad, saturate it with water, but do not have it so wet that the water will run out. Then slip the metal under the tape and cover with rubber sheeting. The latter will keep the clothing dry and prevent the metal from coming in contact with the skin of the thighs.

The advantages of having the metal separate from the pad are apparent. The latter is removable and can be boiled as often as desired without being stained by the metal, which gives a new clean appearance to the pad. When attached, as in the spongiopiline electrodes on the market, the spongiopiline is inclined to shrink away from

the metal, which, coming to the edge of the pad, touches the skin and causes a burn. Although this burn generally heals readily, it is undesirable and may interfere with succeeding treatments. The first few treatments, particularly if large currents are used, sometimes are followed by slight irritation of the skin. If the patient is told to use alcohol and not to scratch the skin, the latter becomes toughened and the difficulty ceases after a few treatments.

SOLUTIONS FOR INDIFFERENT ELECTRODES

Since the continuous and induced currents require the indifferent pad to be wet, in order to overcome the resistance of the epithelial layer of the skin, the conclusion naturally is that water is a good conductor of electricity. Such is not the case. Pure water is a poor conductor of electricity, becoming a good conductor only when it contains impurities and various salts in solution. If a small amount of sodium bicarbonate or sodium chloride is added to the water, its conductivity will be greatly increased, and therefore greater volume of current will be obtained, owing to decrease in resistance.

Even though, if one's apparatus is adequate, it is not necessary, it is excellent practice to wet in-

different pads in sodium bicarbonate solution, a dram to a pint.

If dependent upon a battery of cells, one is often compelled to use the salt solution to get as much current as is desired.

ACTIVE ELECTRODES

While a great variety of electrodes has been made for use in gynecology, the best work is done with a comparatively small number.

As the most successful physician is the one who understands a few drugs and judges wisely as to the application of these, so the experienced electro-therapist, as a rule, has *a small number of select electrodes* and understands exactly how to use them. The beginner will find the copper ball, two or three intra-uterine copper sounds and three olive-tipped electrodes sufficient for a large number of cases. Others, such as intra-uterine sounds of platinum and of zinc, bipolar electrodes, etc., may be added as one sees the need for them.

INDICATIONS FOR THE COPPER BALL

The copper ball is used for a large variety of cases—in fact, with one or two exceptions, wherever electricity is applied in the pelvis unless an intra-uterine application is indicated. Copper, being electro-positive, is carried into the tissues

when applied to the positive pole. On account of its remarkable germicidal and astringent properties, it meets the requirements so often necessary for inflammatory, infective processes in the pelvis. Metals, except platinum, used with the positive pole are always oxidized. For this reason, with that pole, the composition of the electrode must be considered. The negative pole does not affect metals, therefore it is immaterial what metal is used with that pole. The copper ball, therefore, is a good electrode for either pole of the continuous current and is useful, as well, for various other currents.

IMPORTANCE OF COVERING THE COPPER BALL

If the copper ball is used without covering, the energy of the current will be spent chiefly upon the vaginal mucous membrane. This is desirable only when the object of the treatment is directed toward that membrane or an erosion upon the cervix. In this case the ball may be amalgamated and used bare.

If, however, organs, beyond the vagina, are to be influenced by the treatment, to prevent too great irritation of the vagina and insure the carrying of the copper deeply into the tissues, it is essential that the ball be covered. If, for the purpose of breaking up adhesions or to meet other

indications, the negative pole is chosen, it is absolutely necessary to cover the ball. The bare electrode, with this pole, produces electrolysis of the tissues, and an ugly scar proportionate to the amount of current will result after healing has taken place.

It is a common and exceedingly faulty practice to use a covering of absorbent cotton to be discarded at the end of each application, a new covering being applied for the next treatment. That the best results will not be obtained by this method is readily understood, when we consider how far the copper must travel before reaching the deeper structures.

The cotton must first become saturated with the metal; this requires one or two treatments, depending upon the strength of the current and length of time it is continued. The probability is, that, when the ball is recovered each time, very little of the copper gets farther than the cotton, whatever benefit the patient derives being altogether due to the polar effects of the positive pole. If the copper-saturated cotton be left upon the ball the copper will be ready to pass from the cotton into the tissues. The cotton will, at each successive treatment, become more and more filled with copper, which, in consequence of its affinity for the negative pole, is taken off con-

tinually from the ball. To obtain results at the outset it is well for the first one or two treatments, before the cotton has had time to become saturated with copper from the ball, to wet the cotton with a weak solution of copper sulphate instead of water.

THE SELECTION OF THE COPPER BALL

Until recently copper balls have been made without perforations and with solid stem handle, but, on account of the special covering, which will be described later on, the perforated ball



Fig. 3

with hollow stem has marked advantages over the non-perforated. This ball electrode is known as Neiswanger's vaginal, cataphoric electrode (Fig. 3).

If the ball has not been used on other cases, the surface of it will be bright and smooth; but if it has been used on the positive pole of the continuous current it will be covered with a thick deposit. This is due to the fact that, with the positive pole, much of the energy of the current is expended upon the electrode itself and the lat-

ter becomes oxidized. This deposit interferes with the free passage of the copper. For this reason the surface of the ball should be brightened before it is recovered. A file may sometimes be found necessary for this purpose, but ordinarily sand paper or sapolio is sufficient.

DIRECTIONS FOR COVERING THE COPPER BALL

Select a smooth layer of absorbent cotton three inches square. Divide the cotton at the edges only into two layers; turn these edges in, to meet in the center, thus making the cotton thicker in the center than at the edges (Fig. 4).

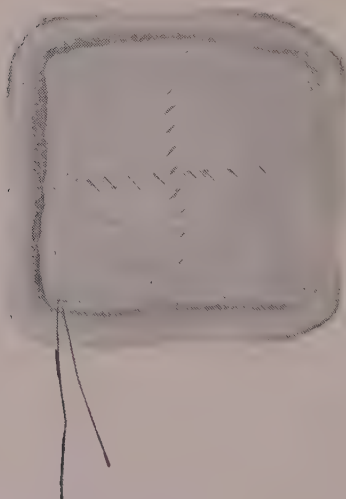


Fig. 4

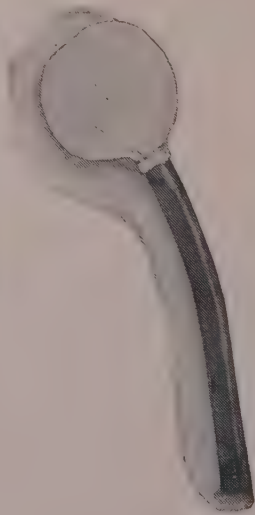


Fig. 5

With needle and thread sew this firmly through and through to prevent any possibility of the cotton pulling apart. Then run a thread in at the edge. Place the rough side of the cotton next to the copper ball; draw up the gathering string very tight and tie it securely. We are now ready for the final covering, which consists of a piece of gold beaters' skin or animal membrane. This is prepared from the pericardium of the sheep, is very thin and, when wet, an excellent conductor of electricity. It is used also by druggists for capping bottles and is sold under the head of bottle capping. It may also be procured at physicians' supply houses.

Place the gold beaters' skin over the cotton and tie it firmly, as seen in the accompanying cut (Fig. 5). One layer is sufficient, as it can be replaced at any time when it becomes torn or is worn through.

Advantages of the Gold Beaters' Skin

First, it protects the tissues so that considerably more current is tolerated; second, it furnishes a smooth surface, easily sterilized; third, in consequence of the non-porous property of the membrane, no secretions pass through it, which prevents the cotton from becoming soiled. The copper-saturated cotton is absolutely sterile, all that

remains for sterilization being the outer surface of the gold beaters' skin; fourth, the ball with the smooth surface of the skin is much more easily introduced than with a rough cotton surface.

The reader is no doubt wondering if this covered electrode is to be used upon a number of patients. Although the copper salt makes it sterile, and although it is kept in a strong antiseptic solution between treatments, I never pass these electrodes from one patient to the other.

Physicians sometimes object to buying more than one electrode, but I tell them that one should be able to afford an electrode for each patient, who is to take a course of treatment, at least, until one has a supply on hand. For example, if three patients are to take treatment, the operator buys three electrodes and covers them in the manner above described. After these patients are through being treated the same electrodes, cleaned and recovered, will be ready for three other cases.

It is always well to have one or two electrodes covered and ready for unexpected cases.

CARE OF COVERED ELECTRODES BETWEEN TREATMENTS

Thoroughly cleanse the surface of the covering with soap and water and put the electrode away in a good antiseptic solution. For example,

ichthyol and glycerin, 1-1000 bichloride or denatured alcohol.

I take a large mouthed bottle supplied with a good cork, divide the cork in the middle lengthwise and then cut out the center of each half, so that the stem of the electrode will fit in between the two halves of the cork (Fig. 6).

Before using the electrode thoroughly rinse off the solution. To make sure that the cotton is thoroughly saturated with water, let water flow freely through the hollow stem and press the ball firmly several times with the fingers.

The electrode coverings, if not kept in a solution, become so dry that it takes some time and pains on the part of the operator to be sure that they are thoroughly wet. Should they be dry, no current would pass and there would be the annoyance of removing the electrode and repeating the process.

INTRA-UTERINE ELECTRODES

Platinum, carbon, silver, zinc and copper are all materials used, according to indications, for intra-uterine electrodes. The first two, platinum and carbon, are used simply for polar effects. For example, sedation with the positive pole in a case of uterine neuralgic dysmenorrhoea.

It is in accord with my experience that 95 per



Fig. 6

cent of women, who come for treatment of the pelvic organs, suffer, either alone or in combination with inflammatory infection of other organs, from an endometritis or an endocervicitis. For

this involvement of the endometrium both copper and zinc are extensively used and are wonderfully effective. For most cases I find copper amalgamated with mercury the most useful. Zinc is more of an escharotic than copper and is preferable to the copper only when considerable destruction of tissue is desired.

THE SELECTION OF THE COPPER SOUND

So many varieties of copper, intra-uterine electrodes, are on the market that the inexperienced are in doubt as to which is the most desirable. To add to the difficulty, false statements have been made with reference to the effects of the application.

It is claimed that lack of insulation of the copper, where it touches the internal os, will, because of closer contact at that point, cause too much energy to be spent upon it, and that cauterization, resulting in scar tissue, will give rise to trouble later on.

It should be remembered that, strictly speaking, the process is one of cataphoric electrolysis, not one of cauterization. Pure copper leaves the electrode because it has an affinity for the negative pole and is repelled by the positive.

Molecules and atoms are decomposed. There is a separation of ions only, the cations being

farther and farther removed from the positive pole, while the anions accumulate about it. There is no actual destruction of tissue, hence no resulting scar.

If the mucous membrane of the entire length of the uterus is inflamed, I always use a sound having not less than $2\frac{1}{2}$ inches of copper exposed



Fig. 7

(Fig. 7), with no insulation for contact with the internal os, and have done so for years.

Patients, carefully observed and examined long after, have in no instance shown any unfavorable symptoms resulting from this mode of treatment. The tip of the sound may be insulated or not, as preferred. A little care will render insulation unnecessary. Owing to the concentration of current at points of electrodes, if the tip is not insulated, after insertion to the fundus, the electrode should be slightly withdrawn. For treating the cervix alone, with no involvement of the internal os, the tip should be insulated.

SIZE OF THE INTRA-UTERINE ELECTRODES

Since the object of treatment by copper electrolysis is to thoroughly saturate every part of the diseased membrane with germicidal and astringent copper, therefore, it follows that the

larger the surface of the metal in contact with that membrane the more completely will the object sought be attained. Hence the sound should be as large as will consistently pass without force and with a moderate amount of discomfort to the patient. Patients differ very much in tolerance of the electrical current as well as in endurance of the passage of the uterine sound. Consequently, it is advisable to pass a small sound at first, giving one or two mild treatments, until it is ascertained what the patient can endure with impunity.

For the above reason, I seldom pass an electrode beyond the internal os at the first application. The patient then acquires courage and will, after a time, endure whatever is necessary.

ADVANTAGES OF BARE INTRA-UTERINE ' ELECTRODES

The prime object of intra-uterine, unlike that of most vaginal treatments, is not, as a rule, to reach deep parts, but to affect a diseased endometrium.

The muscular structure of the uterus generally is best treated through the vagina.

Our object is to make a local application, for the purpose of influencing the lining of the uterus alone and of permeating this glandular membrane

with a powerful germicide, and that object is best accomplished with the bare electrode.

The difficulty of inserting the covered electrode and the danger of leaving the covering in the uterus are serious objections to its use.

DIRECTIONS FOR AMALGAMATING ELECTRODES

If the metal surface to be amalgamated is not already smooth, scour it with sapolio, or rub it with sandpaper. Having done this, dip it in sulphuric acid and then in metallic mercury. Rub it briskly with absorbent cotton and it will assume a bright silvery surface. Acid nitrate of mercury may be used to take the place of these two solutions. The latter is somewhat harder upon the electrodes, but is slightly more convenient, one solution instead of two being necessary. Each time the electrode is used the amalgam should be renewed. Amalgamating electrodes prevents their sticking and renders them absolutely sterile. As mercury offers more resistance than copper, it is probable that little, if any, mercury is carried into the tissues.

CHAPTER III

ABNORMALITIES OF MENSTRUATION

Amenorrhoea: Although amenorrhoea, in the strict sense of the term, is an absence of the menstrual flow, it is customary, in practice, to consider it as scanty or suppressed menstruation. From this standpoint, for convenience in determining the best methods of applying electricity, we divide amenorrhoea into three classes—those in which there is an infantile uterus, an atrophic uterus, or a uterus apparently normal.

Infantile Uterus

I. An infantile uterus with stenosis and flexion, giving rise to sterility, is a common cause of amenorrhoea. Rapid dilatation and straightening of the uterus is much less in vogue than formerly, for the reason that this treatment is directed toward the result rather than the cause of the trouble.

Although by this method temporary relief is obtained, contraction again takes place, the uterus is still in its infantile state and nothing really has been accomplished. The reverse is true of the treatment to be described. Even those who give

to electricity only a minimum amount of credit, recognize its value in dealing with infantile uterus. Gradual dilatation with the negative pole of the continuous current, followed by development of the muscular walls of the uterus with massage by the induced or sinusoidal currents, brings about permanent relief.

Whether the constriction is at the external os, constituting the "pinhole os," at the internal os, or the entire length of the cervical canal, and whether it is congenital or acquired, the treatment is the same.

While acquired cases are somewhat rare, they are more common than formerly, often being caused by excessive repair of the cervix. I have seen "pinhole os" from this cause give rise to severe symptoms.

Technique of the Treatment of Infantile Uterus

Place the patient in the dorsal position. Thoroughly wet the large cotton pad, slip in the metal plate and connect the distal end of its conducting cord with the positive pole of the current. Cover the pad with rubber sheeting in such manner as to protect the clothing and prevent any metal touching the skin, and place the cotton side of the pad next to the skin, under the clothing, upon the abdomen.

Select an electrode with olive-shaped tip just a little too large to pass the constriction. A set of olives, of different sizes, to be screwed as desired to a single metallic stem, insulated with hard rubber, are commonly sold for this work. The possibility that the olive may become unscrewed and



Fig. 8



Fig. 9



Fig. 10

lost in the uterus is an objection to these electrodes. Metallic stems terminating in olives will insure safety and add only a little to the expense. Three such electrodes (Figs. 8, 9, 10) with different sized tips will be enough for average cases. The larger olives sold in *the set* seldom, if ever, are used.

After introducing the speculum and cleansing the vagina and cervix with an antiseptic solution, taking special care in this regard, as we are to use the non-germicidal pole, place the tip of the electrode previously connected with the negative pole of the continuous current, without pressure, against the constriction. Turn on, through the rheostat, five milliamperes and let the current pass, but for no longer than five minutes, until the olive enters the stricture. Should it fail to pass in that length of time, continue the same current two minutes longer, interrupting it from 25 to 40 times per minute through the rheotome.

Sometimes the olive, in consequence of the contractions, produced by the interruptions, will slip through the constriction when it would not otherwise do so.

If the olive does not pass at the end of this two minutes, turn off the current, remove the electrode and repeat the operation with the same electrode three days later. A curve of the stem

of the electrode conforming with that of the uterus and pressure backward upon the speculum with the electrode greatly facilitate the entrance of the olive.

Should the olive pass the stenosed part, turn off the current; change the switches to the induced current with the rheotome in circuit arranged for forty to sixty interruptions per minute. Through the rheostat turn on the current, being guided as to the amount, by the tolerance of the patient. Contraction should be felt distinctly but should not be painful. At the first application let the current pass three minutes only. Subsequently, as the muscular walls of the uterus gain in strength and tolerance, extend the time gradually to ten minutes. The purpose is to strengthen, not to exhaust, muscles which are already weak.

Here, as elsewhere, best results are secured by giving nature plenty of time to do her part of the work. Let at least three or four days intervene between treatments. If, at the second sitting, the olive previously passed enters the opening unaided by the current, select one a size larger; proceed as in the first place, using not more than five milliamperes with the continuous current at any time. From one to three months will be required to perfect a cure, depending upon the severity of

the case. If possible see the patient every three months for a year, and pass a medium sized olive. Do this in obstinate cases especially, to make absolutely sure that a permanent result has been obtained.

Nowhere is technique more important to success than in this apparently simple operation. What, then, has been accomplished?

Indurated tissue has been softened, blood vessels have been dilated, these and other absorbents having been stimulated to carry off the products of decomposition. Electrolysis has not been sufficient to produce scar tissue, consequently we have dilated permanently the stenosed part. By massage with the induced current we have developed the muscular walls of the uterus and increased its size.

II. Amenorrhoea in Which the Uterus Is Atrophic

Degenerative changes in the uterus, arising from abortion, loss of blood, debilitating diseases or surgical operation, call for local tonic treatment.

To increase the circulation and improve nutrition, the negative pole of the continuous current, per vagina, followed by any current that will pro-

duce contractions of the uterus, will be beneficial.

*Technique of the Treatment of Amenorrhoea
When the Uterus Is Atrophic*

Select a vaginal cataphoric electrode (see Fig. 3); cover in the manner described under "covering of the copper ball" (see Fig. 4). Arrange the patient as for amenorrhoea with stenosis. After connecting it with the negative pole of the continuous current insert the cataphoric ball by means of the tragacanth lubricant, without a speculum, to the cul-de-sac of Douglas. Turn on thirty milliamperes of current and let pass for ten minutes. Gradually turn off the current and, leaving the electrode in the same position, change the switches to the induced current, interrupting through the rheotome about sixty times per minute. Begin with five-minute treatments, subsequently increasing the length of time according to the usual custom. If one has a sinusoidal equipment, that current is always better than the induced current.

The technique is practically the same, but will not be given in detail as the number of practitioners who own the sinusoidal apparatus is comparatively small.

As this form of amenorrhoea often is associated with headache, mental depression and gen-

eral weakness, the Morton Wave current locally applied is used to great advantage. Not only does this current cause deep and painless contractions of the uterine muscles and stimulate the circulation thereto, but it also provides a general tonic for the patient.

THE MORTON WAVE CURRENT

This is a one-pole current, therefore no indifferent pad is necessary. Let the patient assume Sims's position upon an insulated table or a reclining chair upon an insulated platform.

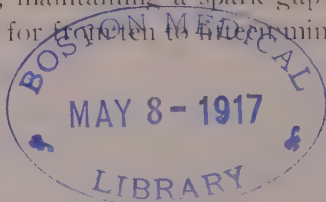
Choose a metal ball or bulb-shaped electrode



Fig. 11

intended for the vagina or rectum; introduce it without covering into the rectum or vagina against the uterus.

The electrode is more easily self-retained and the treatment just as effective when administered through the rectum. Connect the rectal electrode with the positive pole and ground the negative. Start the machine with moderate speed. Begin the treatment with the prime conductors closed and, standing on the grounded side, gradually separate them, maintaining a spark gap of three or four inches for from ten to fifteen minutes. If



possible give treatments daily until some improvement is manifest, then less frequently as is deemed advisable.

This current has none of the tetanizing action of the induced current, and therefore may be given longer and more frequently.

III. Amenorrhoea in Which the Uterus Is Normal

When no pathological condition exists in the uterus or its appendages, amenorrhoea often is due to constitutional dyscrasia, the most common of these being the tubercular diathesis, chlorosis and neurasthenia. No local treatment is indicated, but general static electricity is of unquestioned value.

Illustrative Case

The patient was eighteen years of age. One sister had died of general tuberculosis; another sister had incipient pulmonary tuberculosis, and the patient herself was delicate and had enlarged cervical glands. The menses had been absent one year. She had been under tonic treatment for one year, but had failed to improve.

Positive static insulation administered daily for twenty minutes after the fourth treatment re-established the menses. Treatment was given three times weekly for three months, after which

the patient remained well for one year, when the amenorrhoea returned. Now, having faith in electricity, she again took treatment and, as before, functions were soon re-established.

Static insulation was chosen as an equalizer and tonic in preference to any other form of current.

Technique of Static Insulation

The patient sits upon a chair on the insulated platform with bare hands holding a shepherd's crook connected with the positive pole of the static machine.

The negative pole is grounded to a water pipe or gas fixture. The prime conductors are separated as widely as possible. The machine is then made to run with good speed, making from 150 to 200 revolutions per minute. This speed is necessary in order to maintain the high charge upon which good results depend. The treatment is given twenty minutes daily until the patient improves, which generally requires from four to six days, then on alternate days from two to three months. Static insulation as an equalizer of the circulatory and nervous forces and a general tonic is indicated in the various diatheses, and any of the forms of anaemia. The sedative static breeze or brush discharge is better adapted to Neurasthenia.

Technique of Static Breeze

First method: Ground to the gas fixture the active electrode, which may be either a metal-pointed crown from one to three feet above the patient's head, or a point electrode, either single or multiple, held by the operator and directed toward the patient at sufficient distance to produce a spray, but no spark. Ground the negative pole to the water pipe. Separate the prime conductors beyond sparking distance. Let the patient, on the insulated platform, hold the shepherd's crook connected with the positive side of the machine.

Second method: There is no grounding in this method. The patient holds the shepherd's crook connected with one side of the machine, while the active electrode, crown or point, is connected with the opposite side. For sedation as indicated in Neurasthenia the active electrode is made positive.

This is the simpler method, and, for this reason, is recommended to beginners. There is less potential than in the grounded current but the results obtained are excellent, particularly if attention is paid to polarity. Contrary to theory and the belief of many electro-therapists practical experience has convinced me that it is as important

to consider polarity with static electricity as with the continuous current.

DYSMENORRHOEA

The most comprehensive classification of dysmenorrhoea according to its causes, is the following: Neuralgic, obstructive, congestive and membranous.

As there is no pathological condition recognizable in neuralgic dysmenorrhoea, our main dependence is upon general sedative tonic treatment. However, an oversensitive state of the nerves, particularly of the ovaries, giving rise to ovarian neuralgia, often is so severe as to call for local sedative applications. The covered metal ball applied per vagina with the positive pole of the continuous current, as for inflammations in the pelvis, gives excellent results.

Young girls of neurotic disposition often suffer from this form of dysmenorrhoea. For these patients, the glass vacuum electrode with the high frequency current has marked advantages. It acts directly upon cell protoplasm, influencing metabolism; by mildly stimulating the circulation it relieves congestion, and in moderate doses is a marked sedative. Besides being efficient it is easily inserted and causes no pain either during or after the treatment.

My results with the positive pole of the continuous current and with the high frequency current have been far better than with the much extolled bipolar faradization.

Technique of Treatment with the High Frequency Current

The patient, uninsulated, is arranged as preferred, either in Sims's or the dorsal position. The glass vacuum electrode (Fig. 12) previously sterilized in strong carbolic acid solution is connected with the resonator or Tesla coil in circuit with the static machine. This is inserted into the

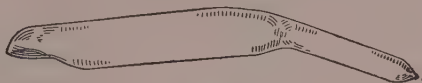


Fig. 12

vagina and placed against the sensitive ovary. The prime conductors are closed, the machine started and run with considerable speed. The prime conductors, together at first, are gradually separated from one to two inches. For sedation the high frequency current is given from five to eight minutes.

Membranous Dysmenorrhoea

The most severe but fortunately rather rare form of uterine dysmenorrhoea is that in which a membrane forms periodically and is cast off with expulsive pains.

Indications for treatment are to destroy the diseased endometrium and stimulate a healthier growth. In such cases curettage has been heretofore our main reliance. Operation is rendered unnecessary by the use of negative electrolysis, a milder and more acceptable form of treatment to the patient who is so fortunate as to fall into the hands of one versed in up to date methods of using electricity. The negative pole decomposes the diseased membrane and favors its expulsion by dilating the canal.

*Technique of the Treatment of Membranous
Dysmenorrhoea*

Thoroughly wet and cover with rubber sheeting the large cotton pad. Connect the metal plate of the latter with the positive pole of the continuous current and place the pad upon the lower part of the abdomen. Through a speculum insert a metal sound the length of the metal surface exposed, depending upon the condition of the internal os.

If this is patulous enough to admit a medium sized sound (See Fig. 7), the latter may have a metal surface extending the whole length of the uterus about two and one-half inches. As the membrane is often most rigid at the internal os, in order to be effective at this point, the metal must come in contact with it. No scar tissue will

result unless so much current be used as to destroy the healthy tissue underneath the diseased membrane.

As a mole may be removed without a scar, if the tissue beneath the mole is not decomposed, so the abnormal endometrium may be destroyed leaving no scar tissue, unless the electrolysis is too deep.

If the os is not patulous it may be necessary to dilate by using different sized sounds or olive electrodes, as described under "Stenosis." On account of the thickened mucous membrane a little more current will be required than for stenosis. The amount of current will be proportionate to the size and length of the sound. This will be from twenty to forty milliamperes for from five to ten minutes, according to the severity of the case. As the condition more nearly approaches the normal, the amount of current may be lessened. Four days should intervene between treatments.

Inter-menstrual treatment for two months generally is sufficient to bring about a normal state of the endometrium, but, in extreme cases, a longer time may be required. As this disease is often found in connection with the syphilitic and tubercular diatheses local treatment should be supplemented by appropriate medication.

The treatment of Obstructive Dysmenorrhoea is given in full under "Amenorrhoea due to Stenosis," that of Congestive Dysmenorrhoea in the chapter on "Inflammations of the Uterus," "Metritis" and "Endometritis."

MENORRHAGIA AND METRORRHAGIA

In speaking of hemorrhages from the uterus we refer not to those hemorrhages which accompany pregnancy or malignancies but to those due to inflammations, misplacements and benign growths. These are accountable for a large majority of cases of excessive flow both during the menstrual period and in the interval between these periods. Whichever one of these causes the disorder, the indications are to check the flow and remove the cause if possible.

Nowhere does *Mother Nature* show such utter helplessness when unaided and nowhere is she more grateful for assistance and more responsive when that assistance is rendered than in controlling excessive hemorrhages from the uterus. Nowhere in the whole realm of therapeutics is there more positive indication for the constricting action of the positive pole of the continuous current. Applications are made either intra-uterine or extra-uterine. In my opinion the intra-uterine method should be used only when there is a path-

ological mucous membrane or a sub-mucous growth.

For all other conditions vaginal treatments are to be preferred. Polar action with bare metal electrodes is superficial rather than deep, the energy of the current being spent upon the tissues in direct contact with the metal. The importance of covering intra-uterine electrodes, if we expect greatly to effect deep seated structures; the impracticability of doing so, the pain caused by the introduction of the uterine sound in a large percentage of cases, even leaving out of consideration that produced by the current, the ability to better penetrate deep growths and inflammations in the pelvic organs with the vaginal electrode, have led me to follow this rule, *when no pathological condition exists in the lining membrane of the uterus or its immediate vicinity and when treatment through the vagina will accomplish the desired result as well if not better, never enter the uterine cavity.*

For technique see "Displacements" and "Fibroid Tumors of the Uterus."

CHAPTER IV

INFLAMMATIONS OF THE UTERUS

CHRONIC PARENCHYMATOUS METRITIS

Seldom, if ever, is the practitioner called upon to treat chronic metritis uncomplicated. This disease, I may safely say, is always accompanied by chronic endometritis. The increased size and weight of the uterus naturally cause it to be displaced downward or backward, if the displacement did not precede the inflammatory condition and furnish a contributing factor to its cause.

The extreme vascularity of the uterus after parturition predisposes to septic infection. This, accompanied by improper management of delivery or abortion, especially if the perineal support be taken away, affords one of the most common causes of metritis or subinvolution. However, indications for treatment depend upon conditions present, rather than upon etiology. If we are fortunate enough to see the patient early, before passive congestion has led to the formation of connective tissue, the uterus is soft, boggy and congested. The symptoms are menorrhagia, dysmen-

orrhoea, dragging pains and often bladder irritability. Indications are for the dehydrating, sedative and anticongestive action of the positive pole of the continuous current, followed by the secondary induced current to stimulate absorption.

The accompanying endometritis requires intra-uterine copper electrolysis, but, for reasons previously given, the walls of the uterus are best brought under the influence of the continuous current by means of a well covered vaginal electrode. For use in the early stages of parenchymatous metritis the astringent and germicidal copper is the best of medicinal agents.

In the later stages, when the uterus is hard-contracted and anaemic, because of formation of connective tissue, with consequent scanty menses, the negative pole per vagina is used with best results.

Technique of the Treatment of Chronic Parenchymatous Metritis

Let us assume that the uterus is retroverted as so often is the case in metritis. The importance of replacing it, if possible, before making any applications of electricity is evident.

With the patient in the dorsal position, adjust the large wet cotton pad upon the abdomen.

Cover with rubber sheeting, taking special care that the edges of the metal and also the cord tip and connector are kept from coming in contact with the skin. Assist the patient in holding the pad firmly while turning to Sims's position.

If the uterus is not easily replaced, apply the ball attachment of the mechanical vibrator over the pubes with the left hand, while manipulating the uterus with the fingers of the right hand.

I have often been surprised to find how much the relaxation of muscles induced by the vibrations has facilitated the replacing of the uterus.

If the case is one in the earlier stage of metritis, use Neiswanger's vaginal cataphoric copper ball electrode (See Fig. 3), covered as described under "Covering of the copper ball." Let warm water run through the hollow stem of the electrode and wash off the alcohol or other antiseptic solution from the outer covering of gold beaters' skin. Connect it with the positive pole of the continuous current and, by the aid of the traga-canth lubricant, introduce it into the vagina to the cul-de-sac of Douglas. Turn on thirty to fifty milliamperes of current and let it pass ten minutes. Then turn the current off and switch in the secondary induced current with thirty to sixty interruptions per minute through the rheotome.

Begin with five minute applications and grad-

ually increase, at subsequent treatments, up to ten minutes. Remove the covered ball, thoroughly cleanse the surface and immerse in a large mouthed bottle containing alcohol or other antiseptic solution (See Fig. 6). Label the bottle and write upon it the patient's name. For advantages of keeping the ball covered ready for use, see chapter II.

If the case be one of the later stage of metritis, characterized by connective tissue formation, use the ball electrode connected with the negative instead of the positive pole, with the same technique as before.

Make vaginal applications three times weekly, always, before each treatment, examining the vaginal tissues to determine whether or not they are intact.

Should they be denuded, on account of the powerful electrolytic action of the negative pole, omit one or two treatments for them to heal.

To hasten this I would suggest the vaginal high frequency vacuum electrode used for five minutes. For technique see "Dysmenorrhoea." This current not only will assist in healing the mucous membrane, but will exert a beneficial influence upon the metritis itself. Believing that, in gynecology as elsewhere, a little variety is a good

thing, I frequently substitute an occasional treatment of this kind for the continuous current.

ENDOMETRITIS

It is the general consensus of opinion that inflammations of the uterine mucous membrane are more often limited to the cervix than was formerly supposed, endocervicitis being a very common disease, endometritis, a much more rare one. Nevertheless, we have many cases of unmistakable endometritis to treat. Whatever portion of the membrane be involved, one has only to give copper electrolysis a fair trial to be convinced that, as a germicide and astringent, in combination with the anticongestive polar action of the positive pole, it has no equal. The selection of the sound, its size and length of metal surface exposed, will depend entirely upon conditions present.

For example: Given a patient who has borne children. There is a cervical tear with an erosion, a large relaxed uterus with a patulous internal os, which readily admits the ordinary sound. From the cervix exudes a profuse mucopurulent discharge. We conclude that the entire endometrium is inflamed and consequently requires treatment.

To avoid the necessity of separate applications

to the fundus and cervix, thereby adding to the tediousness of the operation, we select a sound with metal surface exposed two and one half inches (See Fig. 7), to extend the entire length of the uterine cavity. Should there be somewhat more current action at the internal os than elsewhere, in consequence of the closer contact of the metal, we regard this not as detrimental but rather beneficial because of the too relaxed condition previously existing at that sphincter.

An insulated tip will prevent too much concentration of current at the point of the electrode where it comes in contact with the fundus. Hard rubber is preferable to shellac, as the latter requires time to dry, and therefore is not practical with electrodes which are to be amalgamated.

Technique of the Treatment of Endometritis

Having selected the copper sound, according to the above directions brighten its surface by scouring with sapolio. Then plunge it into ten per cent sulphuric acid solution and then into a bottle containing metallic mercury. Remove and rub briskly with absorbent cotton when it will assume a smooth silvery appearance. As it will tarnish readily, the process of amalgamating should be repeated before each treatment. It is well to amalgamate the electrode, to have the cotton pad, the speculum and dressing forceps ready, and

also to make sure that the machine to be used is in good working order, before preparing the patient. Nervous patients, especially, often complain if kept too long in the gynecological position. By having all appliances in readiness the time is considerably shortened and the patient endures the treatment much better.

Having made the above preparations, place the patient in the dorsal position. Slip the metal plate, connected with the negative pole of the continuous current, under the tapes of the large cotton pad, which has been thoroughly wet with warm water and covered with rubber sheeting, and place the pad upon the lower part of the abdominal region. To keep good contact, instruct the patient to press the pad down firmly with the hands. This will favor a steady rather than a jerky current, which is always annoying. Through the speculum, introduce the sound, which has been sterilized by amalgamating. Connect it to the positive pole of the continuous current and pass it to the fundus. Should the sound not be insulated at the tip, withdraw it half an inch, after inserting, to avoid the concentration of current prone to exist at points of electrodes. Through the rheostat gradually turn on from twenty to fifty milliamperes of current, according to the size of the electrode, the severity of the

case and the tolerance of the patient. It is difficult to give *definite* directions in regard to the amount of current for such treatments.

Women who have borne children, as a rule, will take twice as much current as those who have not. Fortunately, primiparae and virgins are more often affected by endocervicitis than by endometritis.

After two or three mild treatments, with twenty to twenty-five milliamperes for five minutes, congestion and nerve irritability will be sufficiently relieved so that a stronger current can be tolerated more easily than the mild one was in the beginning.

Moving the electrode over the fundus allows a more diffused application of copper and is necessary to prevent the sticking of the electrode if the latter is not amalgamated. However, it has disadvantages. The discomfort of the patient is aggravated by it and the application, at any given part of the endometrium, is less thorough.

As the amalgamated electrode does not stick, my practice is to hold it as steadily as possible, directing it to the right side of the fundus at one sitting, to the left at the next.

At the end of the five or ten minutes, as deemed advisable, *gradually* turn off the current

through the rheostat. The patient, now, is very sensitive and a *sudden* turning off of the current would cause an unpleasant sensation.

Change the switches to the secondary induced current, with the automatic rheotome in circuit, adjusted to about sixty interruptions per minute. Turn on the rheostat, being guided as to the amount of current, by the tolerance of the patient.

Distinct muscular contractions should be perceptible without causing pain. Let the current pass from three to five minutes, increasing the time two minutes at succeeding treatments, until the induced current is given ten minutes.

In answer to a question often asked there is no contra-indication to the use of the tampon for depletion in connection with electrical treatments. It may be said that, while tampons occasionally are beneficial, they often are used when not indicated and when they do actual harm.

After the cataphoric application of copper, in the majority of cases, the reaction, due to the intense constriction, produced upon the soft friable membrane, will, for the first few treatments, cause a bloody discharge from the uterus. Sometimes this continues for twenty-four hours. It does no harm but on the contrary, by relieving engorged blood vessels, is beneficial. To avoid causing the patient alarm, it is well to inform her

of this possible effect of the treatment. As a rule, no severe pain follows the application but a general discomfort through the pelvic region is felt. If possible, remaining at the office in the recumbent position for half an hour does much to prevent this. It is well, also, to advise the patient to avoid being on her feet as much as possible during the remainder of the day.

To allow time for recuperation, it is best to repeat these continuous and induced current treatments but twice weekly. Most cases require two or three months for completing a cure.

What has been accomplished? Copper applied to the positive pole, has found its way into the hyperplastic glands of the mucous membrane because of its affinity for the negative pole. Not only has it entered those cells lying upon the surface of the endometrium, as in the ordinary local application, but the crypts of the glands are saturated with the copper salts. This being a powerful astringent and germicide but one result is possible; germs are destroyed; a certain amount of irritation is produced by the contraction of tissue, granulations form and healing takes place. The chief office of the mercury has been to keep the electrode from sticking.

Because of the dehydrating action of the positive pole, the metal will be firmly imbedded in the

tissues and at first appear to stick. But it may be removed carrying with it nothing but a thick discharge. The often recommended method of releasing an electrode, which is sticking, by reversing the current, is a poor one. The negative pole not being indicated, the good effects derived from the positive pole are in a measure neutralized. Although on account of its high resisting power little, if any, mercury, enters the tissues, it serves a good purpose by preventing the sticking of the copper electrode, thus modifying the severity of its action, and by perfectly sterilizing the electrode.

The positive pole alone, astringent, germicidal and dehydrating, would accomplish much with a platinum electrode, upon which the current has no effect, but its influence is greatly enhanced by the additional properties of the copper.

The induced current has contracted relaxed uterine muscles and has stimulated the absorbents to take up the products of decomposition.

Technique of the Treatment of Endocervicitis

A sound (Fig. 13) is selected which fits the cervical canal and has a hard rubber insulated tip.

As we do not wish to invade the internal os and wish the current action to be concentrated in the lower rather than the upper part of the

cervix the insulation is necessary. The technique is practically that for endometritis. Where cervical tears exist sometimes a very large sound is called for. For one case, I was obliged to have a special sound made, larger than any that could



Fig. 13

be found at the dealers. The current strength should be increased with increase in the size of the electrode.

Illustrative Case

Mrs. L.—aged forty-five, complained of a profuse offensive discharge which had existed eleven years since the birth of the first child.

A large part of that time she had been taking *local treatment* and was very much discouraged. Persuaded by another patient, whom I had treated successfully, she came to try *electrical treatment*. Physical examination revealed a normal condition of the body of the uterus, but a much enlarged cervix discharging a thick gelatinous substance. A granular erosion, the size of a silver dollar surrounded the os. The canal admitted a large sound. Treatments were given to the cervix as follows: Seven in January; ten in February; seven in March; five in April and five in May. The copper mercury amalgamated sound on the

positive pole was used with sixty milliamperes for ten minutes.

This was followed with the sinusoidal current massage, with sixty interruptions per minute, through the automatic rheotome. According to the usual custom, the first three treatments were somewhat milder than those that were given later.

The discharge gradually ceased and the erosion healed. The patient has been well four years.

Endocervicitis, in virgins, should receive gentler treatment. The copper sound is necessarily of small size, has an insulated tip and the active metal surface covers not over an inch of the electrode.

Twenty to twenty-five milliamperes is the average amount of current used.

In oversensitive girls the intra-cervical continuous current is not always well borne. In such cases I use with good results the high frequency current with the glass vacuum electrode. Sometimes it is a good plan to give the first few treatments with the vacuum tube when the patient, becoming accustomed to being treated, will bear the continuous current well. A good method is to use the continuous and high frequency currents alternately.

Technique of Treatment With Glass Vacuum Electrode

After placing the patient in Sims's position, connect the vaginal, or, if too large the rectal glass vacuum electrode, with the Oudin resonator or Tesla coil in circuit with the static machine. Introduce the electrode, directing it toward the cervix. Begin with the prime conductors together and gradually separate them about an inch, when the tube will emit a fluorescent light. Run the machine quite fast in order to keep up a rapidly vibrating current. Continue the seance five to eight minutes only. This is not one of the instances in which if a little is good, more is better. Stimulating, sedative, destructive are the effects of the high frequency current, according to the length of time it is applied. As an irritable, congested condition is present, which we wish to relieve, the first two are indicated, the stimulating action to relieve the congestion, followed by secondary sedation. To produce these effects, the current should be applied not longer than eight minutes. After that irritability is the result and if continued long enough tissue is destroyed. Illustrative of this is the destructive action of the high frequency current upon warts when directed continuously upon them. They may be entirely destroyed in this manner. In addition to the

effects mentioned the ozone and nitrous acid evolved at the surface of the electrode are highly germicidal.

With proper management, there is always a sense of well-being rather than of discomfort following the administration of the Oudin high frequency current. Certainly, in dealing with neurotic patients, this is a great advantage.

EROSIONS

As erosions are commonly caused by excoriating discharges, they generally heal after the dis-

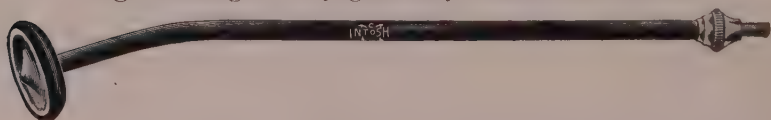


Fig. 14

charge ceases. Should the erosions persist, it is well to give two or three local applications with the Fitzhugh electrode (Fig. 14) amalgamated and bare to the erosion.

Thirty to forty milliamperes with the positive pole of the continuous current will saturate the friable tissue with copper salts. This should be given four days to heal when, if it seems necessary, the cataphoric application may be repeated. Follicular erosions should be opened with a bistoury and then treated with the bare tip of the amalgamated copper sound.

CHAPTER V

LACERATIONS OF THE CERVIX

Until recently lacerations have been almost entirely outside of the domain of electricity, surgical repair being the only means of remedying the pathological condition.

In several cases, treated within the past few months, the cataphoric application of thiosinamin has been so successful in dissolving dense cicatrices, due to cervical tears, as to promise much for the future in this especial field.

Coincident with the cataphoric medication erosions have healed and reflex symptoms, due to pressure upon terminal nerve endings, have been completely relieved. Involution of the body and cervix has also been hastened.

Considering that twenty-five per cent of primiparae are victims of cervical tears and that the majority of these, opposing surgical intervention, are anaemic, poorly nourished, in short nervous wrecks, the curative value of thiosinamin cataphoresis, for this pathological state, appears to be a discovery, which bids fair to be a great blessing to humanity.

Although a large number of patients must be treated and considerable time must elapse to determine definitely just how much may be expected from this procedure, results, so far, would seem to justify, in addition to the above mentioned, the anticipation of relieving acquired sterility, often due to this abnormality, the easy dilatation of the cervix in future child bearing, thereby lessening the tediousness of labor and, most important of all, the prevention of destructive metamorphosis tending toward cancerous degeneration.

An objection to surgical repair is the likelihood of other tears as long as the woman continues to bear children, and the consequent necessity of repeated operations. Dissolving the scar tissue by cataphoresis favors keeping the os patulous and therefore less liable to rupture.

The medicament, which consists of thiosinamin in solution, was first tested on keloid growths by C. S. Neiswanger. The good results obtained by him led him to try it for scar tissue in the uterus.

Thiosinamin, or allyl-sulphocarbamide, is a colorless crystalline substance derived from the volatile oil of mustard seed.

It has been given internally and also by injection for keloids, lupus, etc., with some success.

When using thiosinamin by cataphoresis the vaginal electrode should consist of some metal which will not be oxidized by the positive pole. Otherwise, salts of the metal will be formed in the tissues which will interfere with the action of the thiosinamin.

Such an electrode (Fig. 15) has been designed by Dr. Neiswanger and admirably serves the purpose. It consists of a brass stem with a platinum



Fig. 15

terminal. The entire length of it is insulated with hard rubber, the platinum tip being surrounded by a perforated hard rubber ball three-fourths of an inch in diameter. The latter is provided with a screw, so that it can be separated from the stem, for the purpose of covering the platinum tip with absorbent cotton and this with the medication.

The outer surface of the ball is also covered with a smooth layer of absorbent cotton.



Fig. 16

When the cicatrix is located high up within the

cervix an electrode, (Fig. 16) designed for the treatment of stricture of the urethra, of the same construction as the above, terminating in an olive, instead of a ball, is sometimes preferable.

The solution used is made as follows:

R

Thiosinamin	grs. xlv.
Glycerin	5ij.
Sodium Chloride.....	grs. v.
Water	3vi.

M.

*Technique of the Treatment of Laceration of the
Cervix With Thiosinamin*

As for intra-uterine treatments, let the patient assume the dorsal position with the wet pad upon the abdomen. Connect the latter with the negative pole of the continuous current; wet the coverings of the cataphoric electrode, above described, with the thiosinamin solution, and pass the electrode, connected with the positive pole, through the speculum to the cicatrix.

Turn on, through the rheostat, fifteen to twenty milliamperes of current and let this pass ten minutes. Regulate the frequency of treatments according to the appearance of the tissues.

Thiosinamin has selective power upon scar tissue and, although it has little effect upon the deeper healthy tissues, it has a tendency to abrade

the mucous membrane, if much current is used. When healed, however, one is surprised to find the tissue soft instead of hard and contracted. Because of this effect, treatments should not again be given until the mucous membrane is intact.

This can be determined only by inspection. Usually from three to four days will be required.

The glass vacuum tube, alternating with the cataphoresis, will both aid nature in hastening restoration and exert a beneficial influence upon complicating infective inflammations and other morbid states.

CHAPTER VI

INFLAMMATIONS OF THE OVARIES, TUBES, AND PELVIC CELLULAR TISSUE

Chronic ovaritis, usually resulting from ovaritis in the acute form, is one of the most common affections confronting the gynecologist who does office practice..

The train of symptoms, dysmenorrhoea, irregular menstruation, menorrhagia, severe pains in the inguinal regions and sacrum, radiating into the rectum, bladder and down the leg, sterility and reflex disturbances resulting in impaired general health, are familiar to all. To differentiate between the varieties of chronic ovaritis is unnecessary. It is sufficient to say that this disease, uncomplicated by cystic degeneration or malignancy, is one of the inflammatory affections in the pelvis amenable to treatment by electricity. Most gratifying are the returns in relief of the symptoms enumerated.

Chronic ovaritis is rarely found unassociated with diseases of other organs. A complication of ovarian with uterine inflammation is only a natural consequence of the intimate relationship

existing between the ovarian and uterine arteries. The close proximity of the fallopian tubes and peritoneal covering lead almost inevitably to an accompanying salpingitis and peritonitis. It is well that indications for treatment are the same for all of these—namely to relieve inflammation and combat infection.

Where can we find a therapeutic agent better adapted to meet these indications than the positive pole of the continuous current, especially when, in addition to the effect of its polar action, it is combined with the cataphoric application of copper, one of the most powerful germicides and astringents known?

I quote from an eminent authority the following: "Paint the vaginal vault with iodine and apply cotton tampons with ichthyol glycerin, if this does not effect a cure, the galvanic current should be tried."

Why should we defer for uncertain measures the use of the surest, most rational, and most effective medicinal agent at our disposal, especially in view of the fact, that the treatment is harmless and easily given; that no pain attends its administration but, on the contrary, relief from suffering; and that it is more promptly curative than any form of treatment?

Technique of the Treatment of Chronic Ovaritis

For applications to the ovaries the patient may take either the dorsal or Sims's position.

Sims's position will favor both replacing and keeping displaced organs in position during the treatment. If there are no displaced organs the dorsal position is preferred. It is easier in the latter to keep the abdominal pad in good contact with the skin, without allowing the metal of the pad and cord tip to touch it. The dorsal position also favors the placing of the vaginal electrode directly against the ovary. Having adjusted the cotton pad, after connecting it with the negative pole of the continuous current, the copper ball, (See Fig. 3) covered as directed under "Covering the copper ball," wet and connected with the positive pole, is passed into the vagina and placed against the diseased ovary, just enough pressure being made to insure good contact. The current is now turned on gradually, fifty milliamperes being the average amount used for inflammatory conditions and ten minutes the length of time it is continued.

However, these factors will be governed by the tolerance of the patient and conditions present.

It should be remembered that the sensation felt by the patient, when taking vaginal treatments, is almost entirely in the skin under the indifferent

pad, and that much, therefore, depends upon keeping the skin intact, free from scratches.

The use of a large, thick and sufficiently wet abdominal pad is the best means of preventing irritation. Alcohol applied two or three times daily between treatments aids in toughening the skin.

With proper management there is seldom any complaint after the first two or three treatments.

Vaginal treatments are generally given three times a week, provided there are no abrasions of the mucous membrane. This should always be examined before each treatment and if there is undue irritation one or more treatments should be omitted, or the Oudin current with the glass vacuum electrode substituted. This may be given daily and is a valuable adjunct to the continuous current in the treatment of all inflammatory affections.

Illustrative Case

Mrs. B—, aged thirty-five, had been married eight years and had had one child, age six. Since that time she had suffered from impaired general health, with pain in the left inguinal region, radiating down the leg. Three or four times a year attacks of ovaritis required her to remain in bed for a week or more.

Examination revealed an enlarged tender left ovary. Treatment given with the vaginal cathodic copper ball electrode, technique as above, for ten weeks, resulted in curing the inflammation, as evidenced by the fact that the patient since has been entirely free from pain and has had no more acute attacks of ovaritis.

CHRONIC SALPINGITIS

Inflammations of the fallopian tubes, passing through the same stages as those which affect the ovaries, call for the same treatment, anti-septic, anti-congestive and sedative.

Yet here, on account of the anatomical construction of the tubes, a new problem arises. In health the tubes perform their functions only when both of their extremities are open.

In disease, particularly in case of pyosalpinx or accumulations of other fluids, the prevention of dangerous complications and the promotion of recovery depend upon free drainage through the uterine opening.

What then will be the effect of the positive pole of the continuous current? Will it favor keeping the tube open or will it constrict and cause its closure and thus prevent drainage? The latter would be a decided contra-indication to the continuous current.

In regard to this subject, much confusion exists, even in the minds of those who have a fair understanding of the therapeutical uses of electricity.

It must be admitted that constriction of the uterine orifice by means of the continuous current could result only from a very strong application directly to the opening with a bare metal electrode.

It must be admitted also that such constriction would be impossible, even with an intra-uterine electrode, unless the tip were of bare metal and were passed into the uterus and then directed laterally so as to enter the opening.

To accomplish this a special effort would be necessary, and I doubt whether even then it could be done. If salpingitis in any stage or in any form is complicated by an endometritis, and it nearly always is so complicated, I never hesitate to treat the endometritis with an amalgamated copper sound, having an insulated tip of hard rubber, and I never have had any bad results in consequence. The salpingitis itself, however, is best influenced by covered vaginal electrodes.

It would be impossible, when applied in this way, for the solution of copper salts, diluted by the fluids of the tissues, to be sufficiently astringent to close the uterine opening.

For all patients, suffering from pyosalpinx with closure of the uterine orifice, in whom symptoms are urgent and call for prompt relief, operations are advised.

The cases treated are those which are essentially chronic, whose condition is not extreme, and those which persistently resist surgical measures.

Nevertheless, our results lead us to wonder sometimes, if we would not be justified more often in recommending conservative rather than radical treatment.

The positive pole of the continuous current and the copper salts carried from the electrode itself or from a solution of copper sulphate upon the cotton covering of the electrode, by their double action, sterilize the pus of a pyosalpinx, rendering it thinner and thus more easily discharged through the uterine opening of the tube.

Through the astringent properties of this polar action, in combination with the copper salts, they relieve passive congestion and thus tend to counteract existing abnormal conditions, and prevent the later stages of the disease, which always are the result of long continued, passive congestion, namely, connective tissue formation.

Since salpingitis nearly always is accompanied by ovaritis the treatment of the two inflammatory

affections being identical, for details of the treatment of salpingitis, the reader is referred to "Technique of the Treatment of Chronic Ovaritis."

PELVIC CELLULITIS AND PELVIC PERITONITIS

The clinical picture of chronic inflammation of the pelvic cellular tissue is so nearly like that of the pelvic peritoneum, even where, as rarely is the case, the two exist independently of each other, that the surgeon generally is required to operate before making a diagnosis.

Indications to be met, being the same for both affections, consideration of the electro-therapy of the two will be taken up at the same time.

In a large percentage of cases, the acute stage has passed into the chronic before the specialist is consulted, so that rarely, if ever, is there opportunity for abortive treatment. Thus it is impossible to state, with any degree of certainty, what early attention, with well directed antiseptic and constricting electrical treatment, might accomplish.

Under the circumstances, we refer to the surgeon those cases in which collections of pus with no outlet are present, and all other cases, in which alterations in structure, of sufficient extent to prevent the probability of recovery without opera-

tion, have taken place. It falls to our lot to combat existing inflammations which are not purulent or tubercular and to overcome conditions which are the result of congestive hyperaemia, such as adhesions and induration.

To relieve local stasis and favor the absorption of exudates, we have at least three valuable agents in electricity, the continuous current, the secondary induced current and the Morton wave current.

To break up adhesions and dissolve scar tissue, the negative pole of the continuous current with massage by the secondary induced current formerly has been our chief reliance. Here, for scar tissue, as elsewhere, thiosinamin used cataphorically is proving itself to be of great value.

Technique of the Treatment of Pelvic Cellulitis and Pelvic Peritonitis

In this instance, as for all vaginal applications of the continuous and induced currents, the dorsal position is the most convenient, unless the uterus and ovaries are prolapsed, when, to maintain them in place, Sims's position may become necessary.

Connect the wet pad, adjusted upon the lower abdominal region, with the negative pole of the continuous current and the vaginal cataphoric

copper ball electrode, covered with cotton and gold beaters' skin, (See Fig. 5) wet with water, with the positive pole. Pass the latter, lubricated with the tragacanth mixture, into the vagina and place it in contact with the inflammatory exudate, if such is present. If, instead of this, the case has progressed to the stage of induration and adhesions, use the same electrode, connected with the negative instead of the positive pole. Use from twenty-five to fifty milliamperes for ten minutes and follow with the secondary induced current interrupted thirty to sixty times per minute through the automatic rheotome. Apply this five minutes and gradually increase at successive treatments up to ten minutes. The induced current massage will favor the absorption of the exudate in the early stage or it will, in the later stage, stimulate the absorbents to take up the decomposition products of the negative pole of the continuous current or the solution of thiosinamin (See "Displacements" and "Lacerations of the Cervix").

The Morton wave current from the static machine has some advantages over the induced current for deep pelvic massage. Not only is an intense vibratory motion sent through all parts in proximity to the metal electrode used, thereby forcing on the blood current and stimulating to

absorption of exudates and the stretching of adhesions, but also every nerve and muscle in the body is charged with this high potential, vibratory current. As these diseases nearly always are accompanied by a lowered tone of the system, the improvement of general nutrition enhances to a marked degree the effect of the application. The most practical, and at the same time most effective way of applying the Morton wave current is with a bare metal electrode in the rectum.

(See "Technique of the Treatment of Amenorrhoea in which the Uterus is Atrophic.")

The continuous current per vagina should be applied not oftener than every other day. The Morton wave current will give better results with daily administrations of from ten to fifteen minutes each. I find the following plan satisfactory, to give the continuous and induced currents three times weekly and the Morton wave current on alternate days so that some sort of treatment is given every day.

Not the least important of the effects of the Morton wave current, applied per rectum, is its influence upon constipation from which patients, with pelvic diseases, are prone to suffer.

CHAPTER VII

INFLAMMATIONS OF THE VAGINA AND VULVA—FISSURES AND ULCERS

It is indeed important to institute prompt and efficient measures that vaginitis may not terminate in serious complications. Particularly is this true of the most common and dangerous form of the disease, that due to gonorrhoeal infection.

Cauterization with chloride of zinc, Monsel's solution, and other escharotics has been superseded largely by copper, mercury amalgamated, and applied with the positive pole of the continuous current.

This would be used to a much greater extent than is now the case if the difference between the two methods were more generally understood. The one is applied to the outer layer of the mucous membrane, the other penetrates deeply into the mucosa.

It will be remembered that, in order to carry copper through the vaginal tissues to organs situated beyond it, namely the uterus, ovaries and tubes, it was necessary to cover the ball. We now aim to deposit copper in the vaginal tissue only,

therefore we amalgamate the copper ball with mercury, to prevent its sticking and use it bare.

Some of the modalities, developed in late years, have marked advantages over those formerly used. One of the chief is the Oudin or high frequency current, applied with the glass vacuum electrode. The bactericidal effect of this current, due partly to rays developed in the tube, and partly to the production of ozone and nitrous acid at the surface of the electrode, has been proven by a large number of experiments, by Freund and others, to be sufficiently powerful to hinder the development of some micro-organisms and to destroy others.

Since in curing disease, we so often are obliged to employ agencies which cause temporary suffering, it is with great satisfaction that we find a mode of treatment free from this objection.

The glass vacuum electrode is so easily introduced into the vagina, the current passed so painless, and the effect so soothing, that this form of treatment at once appears to be a boon to both operator and patient.

In the sub-acute stage of vaginitis, when there still is considerable tenderness of the vulvo-vaginal tract, a few treatments with the glass vacuum electrode will relieve congestion and pave the way

for the more powerfully astringent copper electrolysis.

For these infections in cavities, although some claim better results from the Tèsla Coil or Oudin resonator, I prefer to connect the vacuum tube directly to the static machine. Given in this manner, in certain respects, the current simulates the Morton wave, its effect upon the tissues resembling that of the latter current and the arrangement of the machine being the same. It is somewhat more of a tonic than when taken from the resonator and, judging from results obtained, is not less deterrent to pathogenic microbes. The appreciable oscillatory action of the current may be demonstrated by grasping the active part of the vaginal electrode in the hand when an amount of current which would be unnoticed in the vagina, can scarcely be tolerated. This only shows the difference in sensitiveness between the skin and mucous membrane and voluntary and involuntary muscles. To get effects from the vacuum electrode, the necessity of close proximity has led some persons to claim that only at the entrance to cavities is there sufficient contact to be of any benefit and that consequently vacuum electrodes are of no use in cavities. That this is a fallacy can easily be proven by the following: connect the vaginal vacuum electrode in the usual

way. Grasp the active portion of the tube near the handle. That part of the tube only, which is in contact with the hand, will fluoresce. Now loosely grasp the whole length of the tube. Every portion of the tube, where there is the slightest contact, will be excited, although the light will be brighter wherever the tube is most firmly held. It is clear that, in cavities like the vagina and rectum, where the walls naturally fall together, there must be sufficient contact with the vacuum tube to excite the rays, even if it is not as firmly grasped by these tissues as by the sphincters at their entrances.

Technique of the Treatment of Vaginitis

First, with the glass vacuum electrode. Let the patient take either Sims's or the dorsal position, upon the insulated operating table or chair. Ground one side of the static machine, preferably the negative. Connect the vacuum tube, by means of a cord well insulated, with the positive side of the machine. Disconnect the condensers and push the prime conductors together. After starting the machine, introduce the vacuum tube into the vagina. Take care that the conducting cord does not touch the skin or clothing of the patient. Should this happen, even though the cord is insu-

lated, a sharp, stinging sensation will result and cause the patient to jump.

After all is in readiness, gradually separate the prime conductors from one to two inches. A bluish, violet light will appear in the tube. Run the machine with considerable speed to keep up a heavy charge, as is always necessary when currents are dependent upon induction.

Continue the seance for five minutes and repeat the applications daily. In from five to ten days the symptoms will have been modified and the tissues prepared for the astringent application of copper with the continuous current.

Second, the continuous current. First, prepare the abdominal pad and amalgamate the copper ball (Fig. 17). Scour it, dip it in 10% sulphuric acid and then into metallic mercury. Rub it briskly with absorbent cotton and, if it is still not



Fig. 17

coated with silver, repeat the process. After making sure that the apparatus is in good working order and when everything is ready, let the patient assume the dorsal position.

Place the wet cotton pad, connected with the negative pole, of the continuous current, upon

the lower part of the abdomen and cover it with rubber sheeting to keep the clothing dry.

Connect the amalgamated ball with the positive pole, moisten with the tragacanth lubricant and pass it into the vagina, directing it toward whatever part is most inflamed.

If the tissues are very sensitive and the patient neurasthenic, it is often necessary to turn off the current before moving the electrode from one inflamed portion to the other. From three to five minutes with from fifteen to twenty-five milliamperes of current on each side of the vagina will be long enough to deposit a sufficient amount of copper to destroy germs, constrict blood vessels and stimulate the formation of granulations.

Three days should intervene between these treatments. During this interval the vacuum electrode may be used to good advantage.

If patients are seen early and this course of treatment is systematically carried out, recovery will be hastened and complications prevented.

INFLAMMATIONS OF THE VULVA

For sedative, germicidal and astringent effects in combating the various infective inflammations of the vulva, the combination of vacuum tube current and copper electrolysis is as valuable as it is for inflammations within the pelvis.

The high frequency current obtained through the resonator or Tesla coil is generally preferred when treating painful lesions upon the surface of the body, and especially upon the inflamed vulva, on account of the extreme sensitiveness of the external tissues, as compared with that of the lining membrane of cavities.

On account of the greater frequency, contraction of the muscles is not felt and sensations are much less perceptible, than when the vacuum tube is connected directly to the static machine.

Technique of the Treatment of Vulvitis

Place the resonator or Tesla coil in circuit with the static machine and to the resonator connect the vaginal or small body vacuum electrode (Fig. 18). With the patient in the dorsal position, after starting the machine, apply the vacuum tube



Fig. 18

to the vulva. Maintain a spark gap sufficient to excite the tube.

Lightly move the latter over the vulva for about eight minutes. Repeat this application three days in succession. On the fourth day apply the amalgamated copper ball to the most in-

flamed portions, as described under "Technique of the Treatment of Vaginitis."

Again use the vacuum tube for three days and, as before, follow on the fourth day with the copper. Generally, recovery will result in from ten days to two weeks.

FISSURES AND ULCERS

Fissures and ulcers in the vagina, upon the vulva, anus or within the rectum heal with one or two cataphoric applications of copper.

In the majority of cases, local anesthesia should precede the use of the copper. *Technique:* Wet a little cotton with 10% cocaine solution and put upon the anesthetizer (Fig. 10) especially

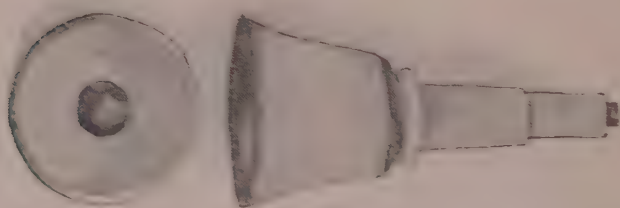


Fig. 10

constructed for this purpose. Place this over the lesion, then connect with the positive pole of the continuous current, an indifferent electrode made negative having been placed upon the abdomen.

Turn on the milliamperes of current and let pass five minutes. Remove the anesthetizer and

apply a small bare copper electrode the size of the ulcer, or the tip of a copper sound, either of which has been amalgamated with mercury to prevent its sticking. Connect with the positive pole and turn on from three to five milliamperes of current.

According to the size of the ulcer and the density of the tissue this amount of current continued for from three to five minutes will be required to fill it with copper salts. The appearance of a gray color over the tissue is a better guide than the time and strength of current. Here, as elsewhere, a little experience and judgment are necessary for best results. It is a good plan to begin gently even if more treatments are required. Owing to the completeness of the anaesthesia and resulting tolerance of the current, there is danger of carrying so much copper into the tissue as to cause severe pain after the effect of the anaesthetic is past. When this occurs, hot applications afford the best means of relief.

CHAPTER VIII

NEUROSES; VAGINISMUS, PRURITUS VULVAE

Vaginismus, or spasm of the sphincter vaginae, that *bête noir* of physicians, is one of the most troublesome affections with which the gynecologist has to deal. Owing to the hyperaesthesia, it is impossible, by ordinary methods not only to treat the sphincter, but also to ascertain the condition of the uterus and ovaries, by disease of which vaginismus is frequently complicated.

Examination, under ether, frequently reveals the fact that it is due to a reflex condition such as ovaritis, fissure in the vagina or rectum or to hemorrhoids. The treatment of these diseases has been given in detail under their respective headings and to these the reader is referred.

Illustrative Case

To show the value of the high frequency current in a case suffering from vaginismus, with inflammation of the vagina and entire utero-tubal tract.

The patient, thirty-five years of age, had had

chronic appendicitis for one year. In addition to pain and tenderness over the appendix there was constant soreness and pain over the pubes and both inguinal regions, amenorrhoea for four months, dragging sensations and profuse leucorrhoea.

It may be of interest to know that the patient's sister, a physician, had attempted the use of the continuous current in the vagina, but had been forced to discontinue it because of the intense suffering which followed.

With the patient in the dorsal position, I made an attempt at examination, which failed on account of extreme vaginismus. I then connected the glass vacuum electrode with the positive side of the static machine and grounded the negative. After speeding the machine, I placed the vacuum tube upon the vulva. Beginning with the prime conductors together, I gradually separated them until the tube fluoresced.

With gentle pressure the latter slipped into the vagina. After passing the current for five minutes I was able to make a careful examination, with little discomfort to the patient. I found metritis and endometritis, a salpingitis, parametritis and a prolapsed, cystic ovary. Daily treatments, consisting of five minute applications with the glass vacuum electrode were given for

one week, after which time the patient came for treatment three times weekly.

At the end of two months conditions in the pelvis were so much improved it was deemed advisable that an operation for chronic appendicitis be performed, as the appendix was still giving trouble. It was also advised that the cystic ovary be removed. However, the patient took the anaesthetic so badly and the operation upon the appendix was so prolonged, that the surgeon decided to defer the removal of the ovary until another time.

After recovering from the operation the patient returned for electrical treatment, which was given with the glass vacuum electrode three times per week as before.

This was continued for one month, when the positive pole of the continuous current was substituted for that with the static machine.

The vaginal cataphoric copper ball covered with cotton and gold beaters' skin (See Fig. 5) was used. Forty milliamperes was now tolerated, the vaginismus present in the beginning having entirely disappeared. In two months more the patient was discharged symptomatically cured.

Though decreased in size the ovary was still enlarged, consisting chiefly of fibrous tissue.

It is now eight years since the case was treated.

She tells me she has done hard work and has not had a sick day since she was cured.

This case serves to illustrate the value of the glass vacuum electrode, particularly its remarkably sedative action, and also the fact that patients under conservative treatment sometimes recover from affections which appear to be curable by surgery only.

Pruritus Vulvae

Although generally a symptom of some constitutional condition, pruritus vulvae often persists after the latter has been relieved. It also is sometimes alleviated even though the original cause of the disorder remains.

The nutritional influence of static electricity, in the form of static insulation, is of inestimable value for the pruritus accompanying the menopause and the gouty and diabetic diatheses.

Locally, for the neurosis, the induced current to produce anaesthesia has been used with some success. More effective and permanent is the high frequency current applied with the glass vacuum electrode, and most positively efficient of all known remedial agents are X-ray exposures.

A certain number of cases of pruritus vulvae yield to the high frequency current. Others are

more obstinate, being somewhat benefited by the latter, but cure results from the X-ray only.

For technique of treatment with the high frequency current see "Vulvitis."

Technique of X-ray in Pruritus Vulvae.

The X-ray should be given with a low vacuum tube. It should be placed so that its surface is four inches from the patient. To avoid the too close proximity of other parts of the body to the tube, a tube shield is essential.

Eight minutes is the average time of exposure, treatments being given every other day.

The X-ray is as nearly a specific for this affection as it is for most diseases of the skin.

CHAPTER IX

DISPLACEMENTS

No more common question is asked by those making a special study of the therapeutics of electricity in gynecology than what can be done for displacements.

The frequency of the question shows how unsatisfactory the usual methods of treatment are for their relief. Under some conditions much may be done for malpositions of the uterus and ovaries; under others, even with persistent work, little will be accomplished.

When, for years, ligaments have been stretched and atrophy of their muscles has taken place, to attempt the restoration of tone would be wasted energy.

When, also, perineal supports have been taken away, by traumatism, it would be mistaken judgment and savor of too great enthusiasm for special methods to attempt to retain the uterus in its normal position by any process, however persistent of "toning up."

As a matter of fact, the uterus is subject to such wide range of motion that it is questionable

as to just what constitutes deviations from the normal.

One is often surprised to find a person, with marked retroversion, suffering scarcely at all in consequence, while another, whose uterus is only slightly tipped, is in a state of chronic invalidism.

The severity of the symptoms generally depends upon the extent of the complications present, such as inflammation and adhesions. In nearly all cases inflammation is present, either having been responsible, by increasing the size of the displaced organ, for the malposition, or, if not the original cause of the difficulty, existing as a result of the dislocation, because of interference with the circulation, pressure upon nerves and so forth.

Heretofore there has been some difficulty in deciding as to how electricity should be given when adhesions and inflammation coexist, the two conditions demanding modes of treatment directly opposed to each other, the positive pole of the continuous current being necessary for the inflammation, the negative for the adhesions. It has been customary first to allay the inflammation with the positive pole of the continuous current and subsequently to break up the adhesions with the negative pole.

We are now able, with Neiswanger's thiosin-

amin cataphoresis, to use the positive pole for the inflammation and, at the same time, to soften the adhesions with the thiosinamin, which is electropositive and which, therefore, must be applied on the positive pole.

Technique of the Treatment of Displacements

I. When complicated by inflammation and adhesions. Wet the indifferent cotton pad with water or sodium bicarbonate solution, a dram to a pint, connect with the negative pole of the continuous current and place upon the lower part of the abdomen.

Wet the coverings of the cataphoric electrode (See Fig. 15) with the solution of thiosinamin, the formula of which is given in Chapter VI. "Lacerations of the Cervix."

By the aid of the tragacanth lubricant pass the electrode, connected with the positive pole, without a speculum, into the vagina against the adhesions.

Through the rheostat turn on from thirty to forty milliamperes of current and let pass ten minutes. Follow with the slowly interrupted induced current from the secondary wire for five minutes.

The latter will aid the circulation and promote the absorption of the dissolved scar tissue.

Repeat seances three times per week unless the parts become sore from the softening action of the thiosinamin. In the latter case substitute the glass vacuum tube current given in the manner described in Chapter VII.

Later, when inflammation has been reduced and adhesions softened sufficiently to permit the pushing of the uterus forward use Sims's position rather than the dorsal.

Replace the uterus as nearly as possible before the treatment and maintain this position while the treatment is being given.

II. When uncomplicated by adhesions and inflammation. Follow the usual procedure in preparations. In adjusting the pad take special care to protect the metal parts with rubber covering. Assist the patient in turning to Sims's position. Replace the uterus and then pass the vaginal cataphoric copper ball (See Fig. 5) covered as described in Chapter II., wet and connected with the positive pole of the continuous current to the front of the cervix. Continuously push the cervix backward so that the fundus can lie forward. Use from thirty to fifty milliamperes of current for ten minutes. Follow with the slowly interrupted, induced current for from five to ten minutes.

This will stimulate absorption, stretch the adhesions, and restore muscular contractility.

Support the uterus with tampons for the first few treatments, discontinuing them later when the uterus becomes better able to retain itself in position.

If this treatment is faithfully carried out three times weekly, in from two to three months there will be substantial reward in relief of such symptoms as backache, dysmenorrhoea, constipation, irritable bladder and sterility.

Illustrative Case

The patient, twenty-three years of age, had been married two years. Disappointed that she had not become pregnant, she came for consultation. Examination disclosed a retroversion with inflammation and adhesions and a prolapsed ovary. Treatment as outlined was given thrice weekly for two months, when the patient left the city. Fifteen months later she notified me that she had been normally delivered of a child.

CHAPTER X

NEOPLASMS OF THE UTERUS; UTERINE FIBROIDS

The name of Apostoli will always be associated with treatment by electricity of fibroid tumors of the uterus. Great credit is due Apostoli, as a pioneer in this branch of electro-therapeutics, not only because his methods were, in the main, successful, his results comparing favorably with those obtained by other men of his time, but also because he aroused a general interest in investigating the treatment of fibroids by electricity and prepared the way for later and better methods.

Although a considerable percentage of cases treated by the Apostoli method was benefited, the dangers incident to the treatment were so great as to prove a serious disadvantage and to bring it into disfavor.

Not long ago a prominent surgeon remarked that electrical treatment of uterine fibroids was a failure, Apostoli himself having proved it so. That this method was not entirely free from objections is no argument against the treatment of fibroid tumors by electricity. Progress has been made in this as in all other lines in medicine.

There are those who still adhere to the ideas of Apostoli and insist upon "galvano-puncture" and negative electrolysis, as the only satisfactory means of dealing with uterine fibroids.

Even these urge the necessity of exercising the greatest care and skill in the technique of the operation. This, alone, would place it beyond the domain of the every day busy practitioner.

These drastic measures have been largely superseded by the more simple, absolutely safe and equally efficient method of the positive pole of the continuous current.

While few could, with safety, administer the Apostoli treatment, anyone, with a knowledge of electro-physics and experience in handling electrodes, can apply the later, more approved method.

With the negative pole of Apostoli large currents were necessary with a view to actually decomposing the growth and allowing it to slough away. The positive pole, on the contrary, has for its object constricting the blood vessels, thereby taking away the nourishment of the growth and thus bringing about a symptomatic cure. Under the positive pole the growth becomes harder and more compact, the amount of decrease in size depending upon the original consistency of the growth.

The treatment with the positive pole of the continuous current, when understood, is easily given, yet no disease, treated by electricity is more dependent for best results upon careful technique than that of uterine fibroids.

It is generally supposed that intra-uterine treatment is necessary for these growths, but experience has taught me otherwise.

It is reasonable that all cases complicated by endometritis should be treated with intra-uterine electrodes, as only local applications to the endometrium will cure such an inflammation.

For all sub-mucous fibroids intra-uterine applications are necessary; for all interstitial growths, unless they have become sub-mucous, vaginal treatment has advantages over intra-uterine as follows:

First, it permits the covering of electrodes which is necessary for deep penetration into growths without destruction of healthy tissue. Second, the pain attending the treatment, in consequence of the large amount of current required, is reduced to a minimum with vaginal electrodes. Third, the growth can be reached more directly through the vagina than through the uterus. Fourth, the dangers of passing electrodes into the uterus, even under the most aseptic conditions, are avoided. Fifth, hemorrhage is often

more promptly checked with vaginal than with intra-uterine treatment.

The first thing to consider in treatment is the size and thickness of the abdominal pad. The sensation felt from the vaginal application is not, as might be supposed, at the smaller, more concentrated, active electrode, but is always in the skin under the indifferent pad.

We are now to use as much current as can be tolerated; consequently the desirability of dispersing the current over as large a surface as possible by an unusually large, thick pad will be apparent.

It should reach from the sacrum to the pubes and from one side of the ribs and hip to the other.

The necessity of removing the corset, in order to adjust so large a pad and the advantage of putting on a loose gown, if possible, will be obvious.

The vaginal cataphoric copper ball may be covered in the usual way with cotton and gold beaters' skin, but in addition to this covering it is an excellent plan, before putting on the cotton, to place a little piece of chamois skin next to the ball. This extra covering will lessen the danger of denuding the vagina and so assist in the use of the larger current.

When the ball is so compactly covered unusual

precaution is required to be sure that the covering is saturated with water. Although a little more time is necessary for the copper to pass out through the extra covering, after a treatment or two the latter will be filled with the copper and a sufficient amount will enter the tissues. One can, by saturating the covering with a solution of copper sulphate, obtain results from the beginning.

When so large a pad is used the dorsal position is always preferable.

Technique of the Treatment of Uterine Fibroids

Place the large pad, wet with sodium bicarbonate solution, a dram to a pint, upon the lower abdomen, the accompanying piece of metal consisting of a piece of block tin, being one inch smaller in all directions than the pad.

Connect with the negative pole of the continuous current and, to keep good contact, instruct the patient to hold the pad firmly with the palms of the hands.

Let water run through the hollow stem of the cataphoric electrode (See Fig. 5), pressing the ball several times with the fingers, to be sure that the covering is thoroughly wet. Connect its conducting cord with the positive pole, apply traga-canth lubricant to the ball, and, without a specu-

lum, slip into the vagina. Pass it up to the outer surface of the growth, making gentle but not undue pressure.

Through the rheostat turn on as much current as the patient will tolerate. This should, if possible, be one hundred milliamperes. It is advisable, however, not to force the current too much at first until the patient has become accustomed to it.

If, as sometimes is the case, not more than sixty milliamperes will be borne without too much complaint, continue the seance a little longer. Give one hundred milliamperes ten minutes, or if not tolerated sixty for fifteen minutes.

Repeat these treatments three times a week only. I yielded in one case to the wishes of a patient and treated her daily until she was convinced that she lost rather than gained time, on account of the soreness which resulted from the too frequent treatments.

The length of time required for the symptomatic cure will depend upon the nature and severity of the case, from two to four months being necessary on the average.

While my results have been such as to warrant some enthusiasm over this treatment of uterine fibroids by electricity, let it be understood that, for a certain class of these cases only, such treatment is selected.

Patients with rapidly growing fibroids, with urgent symptoms, who will submit to such advice, are referred to the surgeon. Sub-peritoneal fibroids do not come under the category of cases for electrical treatment.

Although a long list of cases might be cited to prove the value of the continuous current for fibroids of the uterus, there is room here for only a few illustrative cases.

Case I. Mrs. P., aged thirty-nine, was the mother of two children. She had always menstruated more than normal, but for two years had flowed from two to three weeks in every month. When I began treating her she had been flowing sixteen days.

In the uterus was an interstitial fibro-myoma the size of a small cocoanut. The uterine cavity measured six inches. The positive pole of the continuous current per vagina with one hundred milliamperes three times per week decreased the depth of the cavity one inch per month for three successive months. At her third period, after taking treatment, she menstruated four days only. The uterus now measured three inches.

She was treated regularly for three months and after that occasionally for two months more. It is now about three years since the patient was

discharged symptomatically cured and she still remains well.

In this case the decrease in size of the tumor was far greater than is usual in the denser, more fibrous growths, the latter, even after all symptoms have been relieved, often remaining one-half their original size.

Case II. is mentioned on account of its being particularly notable in relief of pressure symptoms.

The patient had repeatedly been obliged to summon a physician for relief on account of urinary retention. Four months' treatment decreased the size of the growth one-half and relieved her entirely of retention and all other unfavorable symptoms.

Case III. With decided reluctance on my part eight years ago a very large fibroid tumor was treated, the method being that above described. The patient presented the appearance of a full term pregnancy and was suffering from the extreme symptoms which are caused by such growths, anaemia, menorrhagia, etc.

Although there was but little apparent decrease in size, urgent symptoms were gradually relieved. She has since passed the menopause and today is in fairly good health.

I have endeavored to mention a variety of cases

such as are apt to confront the gynecological specialist, one case being a fibro-myoma and one a typical fibroma. The last of the three illustrates the fact that sometimes one accomplishes more than he anticipates.

Would it have been wiser for the patient to have submitted to a surgical operation, rather than choose, as she did, the far more tedious but absolutely safe treatment?

CHAPTER XI

THE ROENTGEN-RAY IN CARCINOMA OF THE UTERUS

In the early days of Roentgen therapy we "caught at a straw" in the hope of a specific for that dread foe of humanity, cancer.

From the curative effects of the X-ray in certain forms of superficial cancers, we confidently expected that, when fully developed and better understood, what was already assured for the superficial would be accomplished for the deeper structures. With improved technique for our watchword we made persistent efforts. Clinical observation and logical reasoning led us to believe that success would be achieved, if only we could penetrate deep-seated growths with a sufficient quantity of the X-rays. With this end in view, we used high vacuum tubes, energized by large currents, only to find that, although able to break down the carcinomatous mass, the ultimate result was absorption, toxæmia and finally death.

The zeal of enthusiasts led to the excessive use of the X-ray. Many insisted on X-ray treatment to the exclusion of surgery and, not understand-

ing its cumulative properties, vigorously pushed the treatment until there resulted necrosis of healthy tissue and impossibility of reparative processes.

The pendulum has, in consequence, swung to the other extreme. Surgery is now generally advised, in all probability wisely, for every so-called operable case, while many have entirely discarded the X-ray for carcinoma of the uterus. The latter is, without doubt, a gross mistake.

What then are the uses of the Roentgen-ray in malignancies of the uterus?

In the first place, it is valuable as an adjunct to surgery, pre-operative and post-operative. The arguments in favor of pre-operative raying are the control of the spread of the disease, which generally attends the use of the ray, even for these deep-seated growths, and the prompt relief of pain when everything else has failed. The objection is often urged that valuable time should not be wasted before operating. Yet it is only rational that any means of checking the extension of the disease will add so much to the chances of recovery without recurrence as to justify some delay in the operation. That the vitality of the tissues is lowered, and that there is consequent delay in healing, is another objection raised against the advisability of pre-operative raying.

In answer to this it may be said that, if a limited number of treatments be given by a skilled operator with the above mentioned object in view, such a contingency is improbable. The value of post-operative raying is more often recognized. Many operators make it a routine practice to advise radio-therapy subsequent to operation. However, it is to be regretted that a large number of surgeons still wait for recurrence, or until they no longer are willing to operate, and then, when too late for justice to anyone, refer the patient to the X-ray specialist.

In addition to its value as an adjunct to surgery the Roentgen-ray is a great boon to the sufferer from the inoperable carcinoma. Until the advent of the Roentgen-ray no treatment was known for these non-surgical cases that could be called even palliative. With this mysterious and remarkable agent we are now able to relieve pain, check hemorrhages and offensive discharges and prolong life.

The life of the patient ends, not as before, in awful agony, but in comparative comfort, on account of lowered resistance.

Illustrative Case

The patient had a carcinoma extending from the neck of the uterus into the walls of the bladder

and rectum, forming a solid mass in the vagina. The case had been curetted and cauterized and was otherwise pronounced inoperable. On account of attacks of severe pain lasting two or three hours, a very profuse and offensive discharge and hemorrhages once in two or three days, the patient was referred for X-ray treatment, with slight hope that it might alleviate the symptoms. With six weeks' treatment the pain, hemorrhages and offensive discharge all gradually disappeared and there was no recurrence of these symptoms. The patient lived eight months in fairly good health, but even though the malignant process was apparently checked, had not sufficient vitality to recover. We cannot but wonder what would have been the outcome had the X-ray been used in the first place and this followed by early operation and post-operative raying.

Whether given preceding or following operation, or for carcinoma for which operation has been refused, results have been most satisfactory from the X-ray when used in moderation.

In spite of brilliant cures reported in a few patients who have been able to tolerate heroic treatment, these are the exception rather than the rule. The factors to be considered, being of necessity changeable, such as inconstancy of tube vacuum, differences in machines and idiosyn-

cracies of patients, none of the methods of definitely measuring the dosage have proved altogether satisfactory. In X-ray work, as in other things, experience is the best teacher. The beginner in this line of work may profit by this lesson learned by those of experience, namely, that it is better to fail on account of too mild doses rather than cause a condition more disastrous than that which originally existed. With improved technique and a better knowledge of the subtle force with which we are dealing, the number of X-ray burns, beyond that of simple hyperaemia of the first degree, is being reduced to the minimum. The work of ten years is convincing proof that in careful hands the X-ray is as safe as any other remedy equally as valuable. The milliamperemeter and Benoist measurements are useful aids in radiography, but in therapeutic work especially must the operator understand his own machines and formulate rules for himself accordingly. Nevertheless, a few directions may be of some value to the student of Roentgen therapy.

*Technique of the Treatment of Carcinoma of the
Uterus with the X-ray*

For X-ray applications to the pelvis, the recumbent position is usually advisable, the patient being so placed that the head is directed away from the rays.

Method of Exposure

Owing to the difficulties attending the use of cavity tubes and speculums and the fact that results do not warrant their use, exposures are now generally made through the abdomen and perinaeum

X-Ray Filters

X-ray filters intervening between the tube and that part of the body to be exposed, consist of material capable of obstructing the soft rays, thereby preventing a dermatitis.

Many operators prefer sole leather to other material, and claim good results from its use.

Leonard, of Philadelphia, reports excellent results with aluminum filters.

The Tube

For deep penetration, a high vacuum tube is necessary. Old adjustable vacuum tubes give best results.

Tests for Vacuum

Though not infallible, the parallel spark gap test for vacuum is the one most relied upon. This test is made by connecting the tube in the same manner as for giving treatment, but cutting out all spark gaps and placing the prime conductors of the coil or static machine together, then turn-

ing on the current and separating the prime conductors until the tube is excited. The distance between them at which the current, instead of sparking across, passes through the tube and excites it, is spoken of as the parallel spark gap. If this is below one inch the tube is *low*, if between one and three inches it is *medium*, and if above three it is *high* in vacuum.

A *blue tube* showing the cathode stream, which becomes *green* by interposing spark gaps, is a low vacuum tube.

A low vacuum tube is readily excited, a high one with much more difficulty, as is demonstrated by the fact that the failure of a tube to become excited may generally be overcome by lowering its vacuum.

Tube Distance

Operators hold varying views as to a safe and at the same time most effective distance. I place the tube so that there is a distance of twelve inches from the anode to the skin. Nevertheless, this is subject to occasional variations due to such factors as differences in equipment, idiosyncrasies of patients, the resistance of a thick abdominal wall, especially where there is a deep layer of fat, or a knowledge of the patient's tolerance, acquired by experience with the particular case.

Time of Exposure

Ten minutes is my average time of exposure with coils. It is advisable that the position of the patient, with reference to the tube, be changed at least once during the treatment so that the rays shall enter the body at different angles and pass in the same direction not longer than five minutes. The time may be increased to fifteen minutes with static machines.

Frequency of Treatments

On account of the cumulative action of the X-ray, treatments should seldom be given oftener than three times a week. A few daily treatments are sometimes deemed advisable and occasionally in skilled hands prove beneficial, but safety is assured by the less frequent treatments.

When a dermatitis occurs, treatment should be discontinued until it subsides.

Apparatus

Static machines and coils for energizing tubes give equally good results.

Exposures should be somewhat shorter with coils than with static machines.

The all important point is to understand your apparatus and know what to expect from it.

Protection of Other Parts of the Body

In treating deep-seated structures in the lower part of the body, if the head be on the inactive side of the tube, no protection of the rest of the body by lead foil or other material is necessary. To insure reaching all lymphatic structures in the vicinity of the growth the X-ray should be allowed as much latitude as possible. Furthermore, there is good reason to believe this wide range of exposure to the rays exercises considerable tonic effect upon the general system. This is forcibly illustrated by the phenomenal gain in weight of patients under X-ray treatment for tuberculous peritonitis.

Time of Beginning Post-Operative Treatment

If treatment is begun immediately, even before the wound is healed, cancer cells, if left from the operation, will be more easily destroyed than they will be if allowed to become imbedded in scar tissue. This is applicable especially to breast cases and should also apply to carcinoma of the uterus. Treatment should be commenced as soon as possible after operation.

*Number of Post-Operative Treatments
Necessary*

There is no way of determining how long

treatment should be given to prevent recurrence. The consensus of opinion of X-ray workers is in favor of raying three times weekly for a period of not less than two months.

Younger patients, in whom carcinoma of the breast and uterus are not infrequent, contrary to the usual understanding, suffer from an unusually malignant form of the disease.

Liability to recurrence will be diminished by raying these at least three months.

Protection of Operator and Assistants

Various devices in the form of screens, shields, etc., are used for the protection of the operator and other persons necessarily present during the treatment.

Of these the lead glass shield affords good protection and is much in favor.

CHAPTER XII

POST-OPERATIVE NEURASTHENIA OR PREMATURE MENOPAUSE

In those instances in which the urgency of the symptoms demand the removal of all of the pelvic viscera, we seem often to be between the devil and the deep sea.

The point has been reached where the organs are beyond restoration and the sacrifice of life is imminent, yet to remove them and induce a premature menopause not infrequently results in a shattered nervous system, a condition no less distressing than that caused by the disease for which the operation was performed.

Although there is no question as to the wisdom of surgical intervention as the least of two evils, it is to be regretted that these patients cannot always have the benefits of static electricity.

The positive static head breeze for sedation and relief of congestion and static insulation to restore lost equilibrium, the principal cause of the nervous disturbance, have unquestioned merit. A few weeks of static electricity at this time greatly

assists in enabling the nervous system to adjust itself to new conditions.

*Technique of the Treatment of Post-Operative
Neurasthenia*

Let the patient sit upon the insulated platform holding a shepherd's crook, connected with the negative pole of the static machine; connect the crown, placed from one to two feet above the patient's head, with the positive pole; separate the prime conductors as widely as possible; remove the jars and start the machine, running it with a moderate amount of speed.

Continue this fifteen minutes; then turn off the current and arrange the machine for static insulation as follows: ground the negative pole to a water pipe or gas fixture. Let the patient hold the shepherd's crook connected with the positive pole; separate the prime conductors and remove the jars.

Start the machine, running it with somewhat more speed than when giving the head breeze.

Give this current fifteen minutes, the entire treatment requiring one-half hour. The head breeze when given by itself is so distinctly sedative as to be somewhat depressing. Static insulation is stimulating and tonic; therefore, the combination is excellent for those who require sedation and still need a general tonic and equalizer.

CHAPTER XIII

CONSTIPATION

That the cure of constipation is an achievement fraught with the greatest benefit to humanity is becoming more and more universally recognized.

One scarcely ever reads an article on constipation in which reference is not made to electricity, yet this is generally regarded as a last resort. "If everything else fails, try electricity."

The inference is that these unusually obstinate cases which refuse to yield to other measures may be cured by electricity. This is a great deal to admit; yet who will deny that not one case of constipation in fifty has the benefit of electricity?

Strictly speaking, constipation is not a subject relating exclusively to diseases of women, therefore it will not be dealt with in all of its aspects in this work on gynecology. However, the pathological condition existing in one form of the disease, namely, that in which atony of the rectum is the main feature, has so marked a bearing upon abnormal conditions in the pelvis that this phase of the subject is deemed advisable for consideration.

The phrase "atony of the intestine" only partly explains what is commonly accepted as the pathology in a large percentage of cases of constipation. That this atony is located principally in the rectum is proven by the fact that more cases are cured by treating the rectum than any other portion of the intestine.

This condition is traced most often to sedentary habits and neglect of the calls of nature, resulting in habitual retention and consequent overdistension and finally permanent dilatation. Torpidity of the liver, on account of the intimate connection between the hemorrhoidal and portal circulation, is not an infrequent contributing factor.

This cause, long continued, eventually results in the formation of hemorrhoids.

Retroversion of the uterus was formerly believed to be a common cause of a co-existing constipation.

It is more reasonable to suppose that pelvic congestion is the result rather than the cause, and that the displacement is secondary to the habitual constipation.

Charles B. Kelsey, quoted in "Sajous' Annual," so clearly describes this permanent condition that I give this quotation in full: "A result of chronic constipation often seen, which may not only simulate, but also cause uterine trouble, is en-

largement and pouching of the lower third of the rectum. This condition is found very frequently in virgins, and gives the pain in the back, discomfort in standing or walking, more particularly in standing, and the sensation of dragging and fullness as if the parts would fall. This is due to the distension and varicosity of the vaginal and uterine veins, caused by the formation of a proctoceles pressing the vagina forward. Efforts in defecation then cause intense pain, pressing the vagina and rectum downward to the pubis and perineum; instead of relieving the patient, however, the traction on the vagina forces the uterus downward, and prolapsus or retroversion results. In this condition, the correction of the retroversion does not give relief since the cause is not the retroversion, but the rectocele, due to the constipation. The proper course to pursue is to cure the constipation, when the reposition of the uterus will cure the symptoms."

That the above is a most common pathological state, seldom understood, is evident from the means so often employed to relieve it, such as purgatives, glycerine suppositories and enemas, which, by further distension, only aggravate the diseased condition.

Stretching of the sphincter muscle tends to relieve the pouching and results are excellent for a

time, but recurrence is bound to take place, as nothing has been done for the atony of the rectum, and the sphincter gradually reverts to its previously contracted state.

In order to secure permanent results, existing conditions must be reversed. Not only is it necessary to secure relaxation of the tight sphincter, but tone must be restored to the stretched-out rectal walls as well.

Purgatives which relieve temporarily, only to cause a worse state of things after their effect has passed away, are admitted to be worse than useless.

The correction of bad hygiene and the employment of various physical measures, such as hydrotherapy, massage and electricity, are the only means of effecting a permanent cure.

In some obstinate and complicated cases a variety of treatments is often necessary. If, for instance, hemorrhoids complicate the case, although they have been the last to appear, they must be the first to be treated; then dilatation of the sphincter muscle should follow; then the tonic treatment to the rectal walls; and finally, or coincidentally, a retroverted uterus must be replaced.

The treatment of hemorrhoids will be given in full later on. For the dilatation of the sphincter muscle, the dilating attachment of the mechanical

vibrator is very effective. The relaxation of the muscle procured by the vibrator enables one to much further insert the dilator without pain than would otherwise be possible.

To overcome the atony of the muscular walls of the rectum, no other form of treatment approaches in efficacy the modified Morton Wave Current, applied directly to the rectum by means of a bare rectal electrode. This produces a deep massage which acts as a substitute for the normal physiological peristaltic action, until eventually the muscularis is sufficiently restored to perform its function unaided.

*Technique of the Treatment of Constipation by
the Modified Morton Wave Current and
Mechanical Vibration*

Let the patient sit upon a chair on the insulated platform. Ground the negative side of the machine to a water pipe or gas fixture. Connect to the latter the medium sized condensers and close the switch. Using the tragacanth lubricant, insert the short rectal electrode (Fig. 20) and by a piece of wire or conducting cord, connect this to the top of the condenser on the positive side of the machine.

Close the prime conductors and start the machine slowly, gradually separating the former

until the patient feels a sensation at the site of the electrode.

Let this amount of current pass about two minutes and then increase the length of the spark gap to from four to six inches.

If the prime conductors are separated gradually there will be neither pain nor discomfort during or after the treatment. Fifteen minutes is the

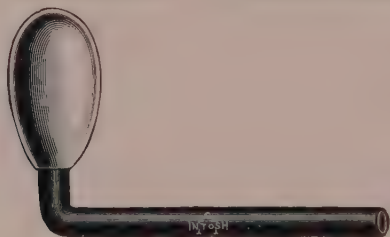


Fig. 20

average length of time if this is to constitute the only treatment given. If it is to be followed by some other form of electricity or by mechanical vibration, the sitting may be shortened to ten minutes.

Daily treatments should be given at first and less frequent ones later as improvement is secured.

Inside of three weeks symptoms are generally somewhat relieved, but, remembering that restoration of tone is the object sought, occasional treatments should be given for two or three months.

Mechanical vibration may be used in conjunction with the Morton Wave Current, or after several treatments with the latter have been given.

This will depend upon convenience and the discretion of the operator.

In many cases a good method of procedure is to use the modified wave current one day and the vibrator the next.

Technique of Mechanical Vibration

Let the patient lie upon the left side. Place the tip of the dilator (Fig. 21), lubricated with tragacanth lubricant, against the sphincter muscle, turn on the vibrator, gradually increasing the speed and making light pressure at the same time

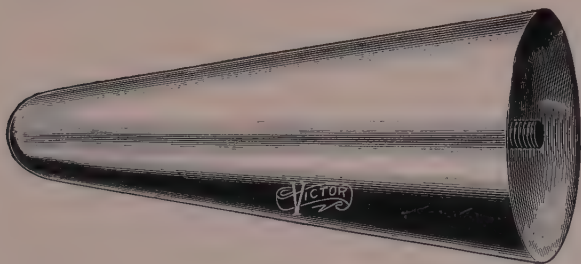


Fig. 21

with the dilator until it passes as high up as possible. Turn the vibrator off and wait a moment before again turning it on. Continue turning on and off for about five minutes. Managed gently with interrupted vibrations, there is not the dan-

ger of overexhausting the muscles that there is when the vibrations are continuous.

For general stimulation to the gastro-intestinal tract, as well as for systemic effect, it is well to follow this application with interrupted vibration to the spinal column, vibrating from the fourth dorsal to the end of the spine, and also to vibrate the colon through the abdominal walls. In the latter the vibrator should have a long stroke and should be passed over the colon from the right to the left side.

The vibratory treatment requires about ten minutes.

Before the development of mechanical vibration I used the modified wave current alone for these cases of atony of the rectum and found it superior to any other treatment. Now by using the two physical agents as adjuncts to each other results are considerably more quickly obtained than before.

To supplement the treatment, from one to two glasses of water to be taken four times a day between meals are prescribed. Laxatives are prohibited as soon as treatment is begun, and a bran cake as a substitute for bread is ordered. This stimulates peristaltic action until the treatment has had time to regulate the functions. I have found it so useful and palatable that I give the

recipe for it, believing that it will be of use to my readers.

BRAN CAKES.

R

- 2 cups wheat bran.
- 1 cup graham or entire wheat flour.
- $\frac{1}{4}$ cup sugar.
- 1 teaspoon salt.
- 2 teaspoons baking powder.
- $\frac{1}{2}$ cup raisins.
- $\frac{1}{2}$ cup English walnuts.
- 2 cups sweet milk.
- 2 eggs.

Bake in muffin tins until well done. This receipt makes twenty-four muffins.

Sig. One, two or three a day with meals.

Those who have followed my suggestions and applied this treatment, as outlined, as a rule are enthusiastic over the results which they have been able to obtain. The one who occasionally fails has, I judge, made a mistake in diagnosis, or has not been skillful in the details of his technique.

CHAPTER XIV

HEMORRHOIDS

When I was a novice in electro-therapeutical work and still in general practice, I was summoned one day to the bedside of a young lady who was suffering from internal bleeding hemorrhoids.

She had sent for me, having heard that I possessed some electrical apparatus. A friend, who had just been operated upon for the same trouble, so vividly described her own sufferings immediately after the operation and later in consequence of stitches which had been overlooked, that she welcomed any substitute for an operation. Having had no experience in treating hemorrhoids with electricity, I told her that I had heard of patients who were helped by such treatment in the hands of other physicians, but that I could promise nothing.

Not being able to walk one block from the street car, she came in a carriage for the first two treatments. After that she was able to take the street car and necessary walk. She was given twenty-four treatments and has been well ever

since. I have treated many cases of hemorrhoids since then with electricity. No case has required as many treatments as did this first one, and I have yet to report a failure.

I recognize the fact that hemorrhoids are easily removed by modern surgical methods, that time is saved by them and that results are generally satisfactory, and have no desire to underestimate their value.

Even if we submit for operation all patients who give their consent, there will yet remain a considerable number for conservative treatment.

One has only to use copper electrolysis in a few cases to become convinced that it furnishes the treatment par excellence for hemorrhoids of the internal bleeding variety.

The one advantage to the patient of surgery over the continuous current copper electrolysis is that it is quicker, there being no comparison in the amount of time consumed in the two means of cure.

I have in mind, however, one of the most satisfactory cases I ever treated, a patient who was cured of hemorrhoids of thirty years' standing with fifteen treatments. The amount saved her besides being spared the operation by accepting the slow but sure method was \$150.

The copper electrolysis, although slow, has

some advantages over surgery. The slight danger always attending the use of an anaesthetic is avoided; the treatment causes little pain and subsequent suffering. The current restores tone to relaxed rectal walls which are present in many cases of hemorrhoids. Surgical measures do not correct this pathological condition, a factor contributing to the formation of hemorrhoids; thus there is the original tendency for other hemorrhoids to form and recurrences are not uncommon.

For the reason last given electricity is more permanent than surgery.

The palliative treatment of hemorrhoids has always been by means of astringents. It is, indeed, logical that their cure should be accomplished by the same agents properly employed.

How often have attacks been relieved and the patient remained well for a long time after receiving a prescription containing lead or tannic acid! Eventually, though, one attack succeeding another, the little tumors become so dense that astringents applied are unable to penetrate the growths and therefore avail nothing.

These very astringents, which by themselves fail, under the influence of the continuous current, penetrate the hemorrhoidal tumors, cause them to shrink and finally to disappear altogether.

Of the various astringents which may be employed for this purpose, copper meets the requirements most acceptably. As its efficacy depends upon careful technique, the latter will be given in detail.

Technique of the Treatment of Hemorrhoids

Select a long or short rectal electrode (See Fig. 11), or (Fig. 20) according to the location of the hemorrhoids. In the majority of cases this is in the lower inch and a half of the rectum.

To avoid the necessity of holding the electrode, so that the copper bulb is in opposition to the growths, thus preventing it from passing beyond them, the short electrode with hard rubber arm (Fig. 20) is of great service.

Fit a piece of chamois closely over the copper bulb; sew it over and over in such manner as to leave no rough surfaces. Keep this in an anti-septic solution between treatments and let it serve as a permanent electrode for a given patient for the entire course of treatments. Not only is the necessity of recovering each time avoided, but the treatment is far more effective for the reasons given under "Covering of the Copper Ball" for vaginal treatments.

Having covered the rectal electrode, test the apparatus to be used to see if it is in good work-

ing order. Place the patient upon the left side with a medium sized wet cotton pad, covered with rubber sheeting and connected with the negative pole of the continuous current, upon the abdomen.

After placing a little of the tragacanth lubricant over the anus, remove the electrode from the antiseptic solution, and pass it into the rectum.

If any of the hemorrhoids are prolapsed and difficult to replace, before introducing the rectal electrode lay a little dry absorbent cotton over the anus and, with the ball attachment of the mechanical vibrator, apply gentle vibratory massage for a few seconds, when the hemorrhoids will pass within the sphincter.

Connect the rectal electrode with the positive pole of the current and gradually turn on through the rheostat from ten to fifteen milliamperes of current. Let the current pass ten minutes.

Repeat sittings every second day and so continue until the case is cured; the average case will require from fifteen to twenty treatments.

CHAPTER XV

STRICTURE OF THE RECTUM

In the incipency of the high frequency therapy, I was led to try the glass vacuum electrode for an obstinate case of stricture of the rectum. This current, owing to its intense vibratory action, its germicidal and sedative properties, appealed to me as rational treatment for this affection.

The case was one of stricture due to extensive ulceration in the later stage of syphilis, involving the upper third of the rectum. There was copious discharge, constant pain, aggravated by efforts at defecation, and extreme constipation, no faeces passing until liquefied. The opening would not admit the index finger.

With the patient on the side and the legs flexed, the rectal vacuum tube (Fig. 22) connected with

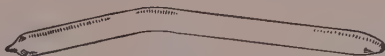


Fig. 22

the positive side of the static machine was passed to the stricture.

The negative pole was grounded, the machine started and the prime conductors gradually sepa-

rated to a distance of about an inch. Daily treatments of five minutes' duration only were given.

Improvement dated from the first application; pain was relieved promptly; the ulcerations healed, and in one month the patient had bowel movements without cathartics.

In cases of stricture where old ulcerations had healed, leaving contraction only, relaxation has resulted from the use of the vacuum tube treatment and constipation has been entirely relieved.

CHAPTER XVI

URETHRITIS

That 90 per cent of cases of gonorrhoea primarily attack the urethra, and not the vagina or pelvic organs, is a well established fact and argues for the great importance of early destruction of the germs in this locality. From past experience, I am led to believe that copper electrolysis in the future will be the accepted and only rational method of reaching those gonococci that lie in the deeper folds of the urethral epithelium and which, under proper conditions, will reproduce themselves and invade the deeper pelvic structures. Inflammations of the urethra, simple or sub-acute gonorrhoeal, are most expeditiously relieved by this treatment. Immeasurably more efficacious than silver nitrate or any of its congeners, such as argyrol and protargol, superficially applied, is this copper germicide and astringent, cataphorically deposited in the deeper, abnormally secreting glandular tissue.

It may be questioned by some whether the positive pole of the continuous current, on account of its acidity, is inconsistent treatment for the de-

struction of gonococci. Our answer is that the copper salt is so powerfully germicidal as to overcome this objection. No benefit whatever is in this case derived from the polar action of the positive pole itself, but the copper is entirely responsible for the remarkable results obtained. For such energetic treatment as that about to be described a local anaesthetic is generally necessary. Making use of the positive pole to carry the anaesthetic into the affected tissue enables one to anaesthetize the part to be treated so perfectly that no sensation is felt even when the current is passed. One is apt, on account of the completeness of the anaesthesia, to use so much current when applying the copper as to cause undue suffering after the treatment, when the effect of the anaesthetic has worn off. The danger of this will be lessened by the use of a suitable electrode.

Neiswanger's cataphoric urethral electrode is far superior to any other electrode for this purpose. It consists of a perforated hard rubber stem containing a twisted copper wire (Fig. 22). The wire is to be covered with absorbent cotton and wet with water or any other solution desired. If the patient remain at the office for a little time after the treatment, and if hot applications are made to the urethra when the anaesthetic begins to wear off, the irritation produced by the cop-

per will pass away more readily than it would otherwise do. In from twelve to twenty-four hours the relief experienced will be so great as to compensate for the temporary aggravation of the symptoms induced by the copper salt. Cases of long standing that have refused to yield to various other treatments are cured by a few applications of this kind. Rarely are more than three or four treatments necessary in order to complete the cure. On account of relieving the inflammatory condition so promptly one should not overlook a possible original or still existing cause of the trouble; for instance, fail to cure a constipation, to give anti-bleorrhagic remedies when indicated or use other adjuvants to the electrical treatment.

Technique of the Treatment of Urethritis

The patient lies in the dorsal position, the indifferent pad of medium size is thoroughly wet, covered with rubber sheeting, made the negative pole, placed above the pubes and firmly pressed down upon the skin by the hand of the patient. The cataphoric electrode above mentioned is connected with the positive pole of the continuous current, the cotton covering the wire having been wet with 4 per cent cocaine solution. The opera-

tor introduces the urethral electrode to the neck of the bladder.

If, for five minutes before passing the urethral electrode, cotton wet with the cocaine solution be laid over the urethra, the passing of the electrode will be facilitated.

The current should be turned on slowly at first and gradually increased, as sedation is produced by the anaesthetic carried into the tissue. From three to five milliamperes of current will produce anaesthesia in from five to eight minutes. This having been accomplished, the electrode is removed, the cocaine solution washed off with warm water and the electrode connected as before with the positive pole and again introduced.

From five to ten milliamperes, according to the severity of the case, is turned on and the current passed five minutes. If the anaesthetic has been skillfully used this latter application causes no pain. In from ten to fifteen minutes the anaesthetic begins to disappear and hot applications should be immediately applied.

This, however, will be necessary only in those patients who are neurotic and not of an enduring temperament.

Four days should intervene between treatments in order to give nature time for repair.

Urethral Caruncle

There are two methods of exterminating these painful vascular growths which appear upon the lower portion of the urethra. They may be characterized as slow and rapid methods. The principles involved in the two are directly opposed to each other, the positive pole being used for the slow method with the object of gradually cutting off the blood supply to the tumor until it shrinks away and disappears; the negative pole for the rapid method to decompose the growth.

The slow is far more tedious than *the rapid method* and is used less often. The rapid method is done under local anaesthesia, the only pain caused being due to the slight amount of current required to carry the anaesthetic into the tissues.

Technique of the Treatment of Urethral Caruncles

1. **Slow Method.** The usual cotton pad on the abdomen is made negative. A little absorbent cotton wet with the 4 per cent cocaine solution is wrapped around a small copper ball. The latter, connected with the positive pole of the continuous current, is placed against the caruncle.

The current is gradually turned on to five milliamperes if tolerated. This is continued until the part is insensitive. The cotton is then removed

from the ball, the latter being amalgamated with mercury and applied to the growth. Ten milliamperes for five minutes may gradually be used with little pain. Treatments are repeated every fourth day.

2. Technique of Rapid Method. Owing to the fact that the negative pole, unlike the positive, is not germicidal, this method should be used under strict aseptic precautions.

It is observed that cocaine, being electro-positive, is applied to the positive pole. When the cocaine cataphoresis is to be followed by treatment with the positive pole, the cocaine passes more and more deeply into the tissues and throughout the treatment the part in consequence is constantly becoming more thoroughly anaesthetized.

The reverse is true when the negative pole is used following the anaesthetic. The cocaine now seeks the surface or negative electrode. For this reason the anaesthesia is more transient and a little adrenalin is advised with the cocaine to contract the blood vessels and aid in retaining the cocaine in the tissues.

With this slight change the anaesthetic is applied in the same manner as for the slow method. The abdominal pad, which has been the negative pole, must now be made the positive. Take a

needle holder containing a sharp-pointed steel needle and connect with the negative pole. Introduce the needle into the growth, turn on from one to two milliamperes of current and let it pass until the growth is softened and discolored throughout. Change the direction of the needle occasionally so as to be sure that the entire growth is decomposed. Dust with boracic acid powder, and instruct the patient to apply an antiseptic solution two or three times daily. The growth will dry up, form a hard crust and come off in about a week, leaving a smooth surface underneath.

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